NOVEMBER
1930

WORLD PETROLEUM

VOLUME 1 NUMBER 10

CONTENTS

Frontispiece	474
Editorial	475
Production	505
Finance	507
Foreign Oil Legion	510

Special Articles

TITLE	AUTHOR	PAGE
Wasting the Benefits of Conservation	Russell Palmer	477
Soviets' Official Answer to the Royal Dutch-Shell	N. Tolstonogov	479
International Oil Interest in Iraq	Alec. H. Day	481
Economic Aspect of Unit Operation	Joseph E. Pogue	485
Venezuelan Oil Production Curtailment		489
Petroleum Situation in Eastern Venezuela		491
How Mexico's Oil Controversy Was Settled	D. Graham	492
Has Germany Extensive Oil Deposits	Dr. Richard Lewinsohn	494
Lowering Tubing in Gas Lift Well	H. A. Brett	496
Story of Hydrogenation, Part II	Dr. R. T. Haslam	500

PUBLISHED MONTHLY

by RUSSELL PALMER

153 Waverly Place, New York, U. S. A.

Telephone: Spring 7398

Cable Address: Ruspam, New York

Managing-Director, T. Orchard Lisle

▼

110 Fenchurch Street, E. C. 3, London

European Director, A. C. HARDY

Subscriptions

ANNUAL subscription to WORLD PETROLEUM is offered at the flat rate of five dollars (U. S.) postpaid to any country in the International Postal Union.

For the convenience of subscribers the publishers will accept payment in any of the following currencies at the fixed rate shown below:

Argentine	14 paper dollars
Columbia	5.25 peso (gold)
France	130 francs
Germany	21 Reichsmark
Great Britain	One guinea
Holland	12,50 gulden
India	14 rupees
Japan	10,50 yen
Mexico	10.50 peso (gold)
Peru	1.25 libra
Poland	45 zloty
Rumania	835 lei
Russia	1 chervonetz
Venezuela	25 bolivar

Remittances or drafts to the order of the Publisher, WORLD PETROLEUM, payable in New York.

Subscriber's name and address should be in Roman capitals on the subscription order.

Official position of subscriber is requested.

Advance notice, if possible, of a change of subscriber's address should be given. Effect cannot be given at once to a change of address. The period of transmission of the subscriber's instructions through the mail extends the time required before the magazine can be mailed to the new address.

▼

Agencies

SINGLE copies of WORLD PETROLEUM are obtainable every month, within the delay imposed by the international mail service, at any of the following agencies:

BUCHAREST—Cartea Romaneasca, Bulevardul Academiei 3
CABIMAS, VENEZUELA—The German Store
CALGARY—D. J. Young & Co., Ltd., 214a—8th Ave., West
CARACAS, VENEZUELA—Casa Letcher, Torres a Madrices 22
CURACAO, D. W. I.—The Book Store Sluyter
THE HAGUE—Martinus Nijhoff, Lange Voorhout 9
LONDON—World Petroleum, 110 Fenchurch Street, E. C. 3
MARACAIBO—Maracaibo Supply Co.
MARACAIBO, VENEZUELA—The Blue Book
MELBOURNE—Gordon & Gotch, Ltd.
MENE GRANDE, MARACAIBO, VENEZUELA—M. S. Sequeraj
MOSCOW—Mezhdunarodnaja Kniga, Kuznetski Mosk 18
PARIS—Librairie Brentano, 37 Avenue de l'Opéra
PORT OF SPAIN—Davidson & Todd, Ltd., 8 Frederick St.
RANGOON—British Burma Press, 48-31 Sparks St.
TAMPICO—La Sonora, S. A., 25 Comercio Oriente
TOKYO—Kyo Bun Kwan, 1 Ginza 4-chome, Kyobashi-ku
SOERABAYA—Het Boekhuis, Societeitstraat 4
WARSAW—Bibljoteka Polska, Nowy Swiat 22

The price of a single copy is 50 cents in Canada, 2 shillings in other countries of the British Commonwealth and the equivalent of 50 cents (U. S.) elsewhere.

▼

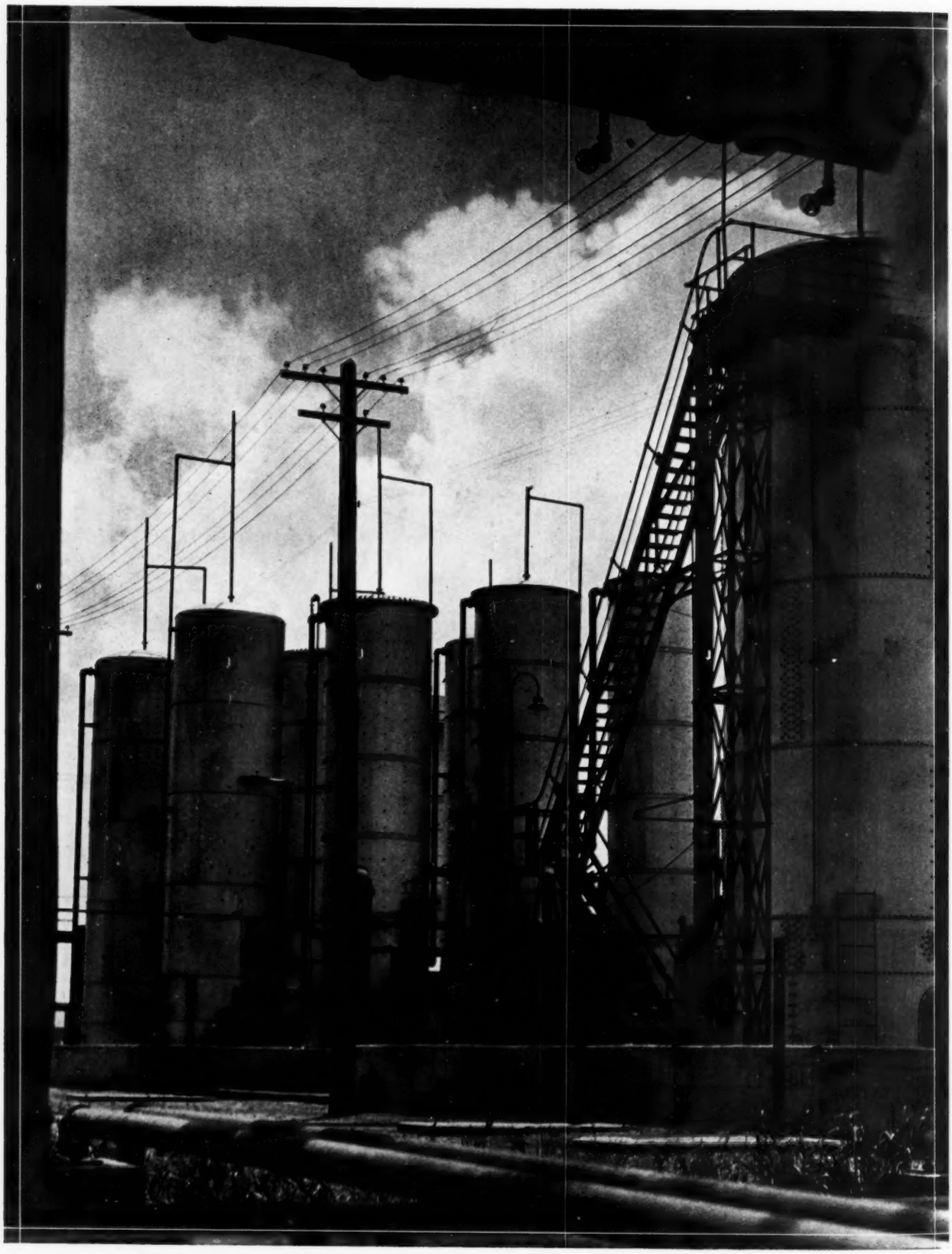
Particular Notices

CONTENTS of WORLD PETROLEUM are copyrighted by Russell Palmer, and contents may not be reproduced without permission.

Manuscripts and photographs submitted to the Editor are received only at the owner's risk. Prompt consideration will be given to them.

The Publisher does not necessarily endorse the views expressed by authors of signed articles. In the service of readers he will not hesitate to give publication to signed opinions in direct opposition to his own.

Advertising rates are scheduled in Standard Rate and Data. Copies of the schedule can be obtained on request to the Advertising Manager, 153 Waverly Place, New York, N. Y., or to 110 Fenchurch St., London.



Continuous Treators, Girards Point refinery, Gulf Refining Co. M. Ritasse

NEW YORK • WORLD • LONDON

PETROLEUM

Gasoline Marketing

LOOMING large among the current problems of the world oil industry is the recrudescence of gasoline price cutting. This is a by-product of overproduction. With available supplies exceeding demand short-sighted purveyors are unable to resist the temptation to gather in more business by cutting profits below the reasonable margin. Human nature being what it is, their competitors promptly meet the cut or go it one better—and the war is on. Profits disappear, confidence is destroyed and nobody benefits, not even the consumer who attributes the reduction in cost to an attempt on the part of the big oil companies to overreach one another and gives them no credit for it. When the damage is done and prices are restored to a normal level the consumer becomes articulate, even eloquent, in his denunciation of grasping monopolists. For we all judge prices on the basis of what we have been accustomed to pay, and if we have grown used to getting any commodity at less than cost we look upon a fair price as extortion.

While the more farseeing members of the industry recognize the evils of price cutting it is not easy to find an adequate preventive. Here is the way the chief executive of one of the leading international oil producing and marketing organizations pictured the situation to WORLD PETROLEUM. He said: "Price cutting usually begins with some dealer who holds contracts calling for commercial discounts that enable him to trim his selling price without suffering an actual loss, and he adopts this means of drawing trade from his competitor on the opposite corner or down the street who perhaps is selling a brand that is better known or more widely favored. Speaking for my own company we have not cut prices; but, we have met openly the prices at which others have been selling covertly. So far as I can see the ultimate result of the present situation will be the elimination of all margin of profit in the sale of gasoline."

Although he did not say so, the opinion of this executive points to the time when the sale of gasoline will rest chiefly in the hands of strong organizations that will find their profit in production and refining. A natural concomitant of this situation will be the abolition of many superfluous selling stations that are now being maintained. If this prediction proves well founded it will mean, in all probability, the stabilization of gasoline prices through the elimination of the price cutters, and the posting of tank-car prices that will allow of proper profit to the refineries. This, after all, though a slow cure, is perhaps one of the means of putting an end to price cutting.

▼

Price Cutting

WITH the available supply greatly exceeding the demand, and with the purchaser unable to tell quality until after he has filled his tank and gone his way, indiscriminate price cutting of gasoline at this time is full of danger to both big and small oil companies. Not only is it likely to start a downward slide of major importance, but many of the smaller concerns may be forced to lower the quality of their product. Profits have already taken a tumble and many of the balance sheets can ill afford the effects of a price war. It is not surprising that the Standard Oil Company of California deems the time opportune to republish a warning by Herbert N. Casson from its Bulletin of October, 1914. "The price cutter," said Mr. Casson, "is worse than a criminal. He is a fool. He not only pulls down the standing of his goods; he not only pulls down his competitors; he pulls down himself and his whole trade. He scuttles the ship in which he himself is afloat. Nothing is so easy as to cut prices; and nothing is so hard as to get them back when once they have been pulled down. Any child can throw a glass of water on the floor, but all the wisest scientists in the world can't pick that water up. Who gets the benefit of price-cutting? Nobody. The man who sells makes no net profit; and the man who buys soon finds himself getting an inferior article. No manufacturer can permanently keep up the standard of

his goods if the price is persistently cut. Pretty soon he is compelled to use cheaper materials, and to cut down the wages of his workers. The man who cuts prices puts up the sign: This way to the junk-heap! He admits his own failure as a salesman. He admits he has been defeated according to the Marquis of Queensbury rules of business. He admits he can not win by fighting fair. He brands himself as a hitter-below-the-belt. If the business world were dominated by price-cutters, there would be no business at all. Price-cutting, in fact, is not business any more than smallpox is health. Whenever you see this sign on a price-cutter's store—*Going Out of Business*—you may be sure it is a lie. How can he go out of business when he never was IN?"

▼

Wanted a Strong Man

ANYTHING that is fundamentally unsound must be rectified. Otherwise it will destroy itself by the working of natural laws. Economists and business leaders recognize that existing methods of oil production are basically wrong but feel powerless to effect a radical change which will be acceptable in all fields by the major companies, independents and town-lot drilling organizations alike. Yet this radical change must be brought about. Hampered by federal and state laws and by individual selfishness the petroleum industry must find the seemingly impossible solution to the difficult problem somewhere within its own borders. Perhaps the quickest road to stabilization would be for the industry to set up a dictatorship as have done a couple of other industries. Then would come the problem of selecting a strong man sufficiently balanced and versed in oil knowledge and who could lead as well as direct, and who could accomplish results without being indicted for restraint of trade. No man with authority short of that of Mussolini could bring about complete rationalization, but somewhere there must be a man who is sufficiently level-headed and who has the ability to at least improve conditions as they are today.

▼

France is seeking to build up a big national petroleum refinery industry.

▼

Politics and Pipelines

DESTINED to play a very important part in international oil affairs as well as in world politics, Iraq's potential petroleum production has been given considerable attention in our pages. As will be appreciated from Mr. Day's article elsewhere in this issue, oil is there and in vast quantities, and its strategic proximity to the Mediterranean will make it a strenuous competitor to both American and Russian oils in the European markets. A virgin field in a hot and wild country like Iraq, 500 miles from the sea is not opened up as rapidly as a new pool on Venice Beach in California, and no doubt it will take from five to seven more years for all phases of commercial production to be completed—including pipe lines to deep water—to the stage where between 50,000 and 100,000 bbl. of crude per day is flowing, even though one of the first Irak wildcats produced this amount. By the time development work is fully completed the world's petroleum industry will be on a sound basis, and consumption will greatly exceed today's quantity. One of the main reasons for delaying commercial production in Iraq has been the pipe line problem, and the most sensible solution would be two lines, one through Syria and the other with its terminus in Palestine. The cost will be higher, but this factor is easily outweighed by political considerations. The line to Tripoli may be started immediately.

▼

Argentine Legislation

WHATEVER new petroleum legislation is required to change the recent "nationalization of the oil industry" in the Argentine, will only be submitted to the Chamber and Senate by the new director of the Fiscal Petroleum Bureau, after careful and unprejudiced study by recognized oil experts, whose aid will be sought. Capt. Felippe Fliess, who has been placed in charge by the new Minister of the Interior, held the same position for four years under a former regime, so is thoroughly conversant with the task before him. He is known to be friendly towards American oil interests. The policy of the new government will be to develop the Argentine oil fields, refineries, and sales to a point where the country is quite independent of imports of crudes and petroleum products. The present activities will be limited to the extent necessary to bring about this situation.

▼

The A. P. I. Meeting

SHORTLY after the publication of this issue of WORLD PETROLEUM the eleventh annual meeting of the American Petroleum Institute will be in session. Most leaders and independents of the oil industry of the United States will be present, and the opportunity presents itself for some constructive work to be done in the way of reorganizing both minds and methods, so that the new year may see the industry well on the way to more common sense and profitable conditions, especially the marketing branch which needs drastic action.

Wasting the Benefits of Conservation

Can Any Reasonable Restriction Bring Prosperity to the Petroleum Industry of the United States While Unsound Marketing Practices Prevail?

By Russell Palmer

AT a considerable sacrifice to thousands of individual producers America's oil output has been sharply cut. Instead of increased stability as a result, the retail price structure has weakened notably and some domestic markets are badly demoralized. The writer of this article takes the stand that price cutting is not an isolated evil arising in market raids, but is due primarily to the unsound price structure of many major marketers who maintain too wide a spread between tank wagon and tank car prices, and extend special terms to certain favored buyers in their fight for gallonage.

DURING the past few years the problem of improving the position of America's petroleum industry has been discussed largely in terms of restricted production—conservation, so called. Begun under great difficulties, this movement at one time assumed the proportions of an international understanding which collapsed when the timid Hoover administration withdrew its support at a critical moment. From this failure it rallied and has gone steadily forward, until, today, by a combination of voluntary curtailment and legislation, the industry has been brought under control in the three principal oil producing states of the Union.

That there has been real restriction is evidenced by recent figures. Production in the United States is running about 500,000 barrels a day less than a year ago. Maintained on an annual basis this decrease will amount to some 25,000,000 tons of oil a year or approximately 12 per cent of the world's production—a truly remarkable achievement considered in the light of America's traditional policy in such matters and the average American's strong aversion to all limitations on private initiative.

Up to a certain point restriction has been effectual. Less oil has been taken from the ground. Although not applied with uniform sincerity the federal government's advice to operate refineries only six days a week has been followed. Most important of all, there has been a substantial reduction of gasoline stocks, which stood at roundly 42,200,000 barrels at the beginning of the year and 36,276,000 barrels on October 18th.

In spite of this progress the position of the industry as a whole in the United States has not improved this year, but has retrogressed, and the outlook at present is distinctly unfavorable.

Current earnings of some of the major companies make depressing reading, and the appearance of annual reports after the first of the year undoubtedly will bring acute disappointment to stockholders. The outlook of the industry for the immediate future as it appears to those who are most conversant with current developments is indicated by the fact that the securities of leading companies are selling now at the lowest levels they have touched in the past seven years.

Conservation apparently has been effective principally from the statistical viewpoint. Less oil has been taken from the ground, less oil has been refined and gasoline stocks have been substantially drawn upon. In the face of these facts the retail market for the finished product not only has not improved, but is in a distinctly bad condition. In some sections, notably along the Atlantic seaboard, the greatest gasoline market in the world, it has been completely demoralized. In others the price structure is shaky and may collapse at any time.

Under these circumstances it is natural that many producers should be coming to the conclusion that the sacrifices they have been making are entirely in vain. They are paying the price of restricted production without compensating benefits. In many instances they are forced to accept substantial reduction from posted crude prices in order to dispose of their already reduced output. There is no doubt that if present conditions continue producers will make a concerted effort to escape the limitations of proration.

A large and sincere group of independent oil producers hold that the way out of their difficulties is to campaign for a substantial import duty on foreign oil. This movement they are carrying on with a great deal of vigor. The writer is not a free-trader. He has the greatest respect for Mr. Wirt Franklin and his associates who are conducting this fight, and on general principles believes strongly in safeguarding. The traditional American policy is one of protection to home industry, and there are many excellent reasons why such a policy should be extended to cover any domestic commodity produced in the United States on a large scale.

As a practical matter, however, it seems doubtful whether this policy, if adopted, would produce the benefits claimed by its advocates. As long as the United States maintains its large favorable export balance in petroleum products it seems more probable that a tariff would result in diverting the present influx of crude—from South America, for example—into other markets, with a corresponding diminution of American exports.

To the extent that it transferred to other countries the business of refining for export now conducted in the United States it would lessen the employment of American labor and capital. Manufacturing plants and other industries de-

pending upon the cheap fuel oil obtained abundantly from imported crude might find the cutting off of this supply a handicap.

Advocates of an import duty face another very practical obstacle to the realization of their hopes. Politically the odds are against them. For every state in which oil production ranks as a major industry there are a dozen whose interest is only that of the consumer. Their representatives will argue that a tariff on oil is a levy on the many for the benefit of the few. In a general tariff revision, with its opportunities for log rolling, Senators and Representatives might do some effective trading, but it seems unlikely that Congress will be disposed to undertake another tariff revision for some time.

Elimination of extraneous issues leads to one conclusion. It is that responsibility for present conditions rests squarely on the marketing end of the business. It was founded and developed on the old theory of alternating periods of over and underproduction, and has never readapted itself to the new condition which it must face for years to come, even under reasonable curtailment of production, of a continuing supply more than adequate to all requirements.

Recently there has been a great noise of thundering against price cutters and price cutting in the industry. A price cutter is a vicious individual who seems to exist only in the third person. I have heard price cutters described in terms that I shall not repeat. They have even been pointed out to me, but I have yet to meet one in person. It is always the other fellow who deserves the opprobrious title. Price cutting is a symptom of industrial disease. The cause, the writer believes, is inherent in the price structure of many of the largest concerns in the business. So long as major oil companies continue to maintain too wide a differential between tank wagon and tank car prices, so long as they extend too generous discounts to certain classes of buyers, nothing short of an actual scarcity of raw material will put the industry on an adequate earnings basis.

It is fundamentally unsound to have two prices to retailers. So long as oil companies maintain dual price levels separated by a wide differential they are supplying ammunition that is almost certain to be used to their own injury or destruction. Apparently at least one large marketing company has recognized the evil of these excessive spreads. At any rate it recently reduced the differential between wholesale cargo and retail prices from eight cents a gallon to six cents. This will not put an end to price cutting, but it seems to be a step in the right direction.

The system of commercial discounts may be theoretically defensible but in actual application, under the stress of competition, it has been stretched to cover serious abuses. Every customer who learns of the existence of a favored class fights to be included in it, and instances have occurred repeatedly of discounts extended to individual consumers on the flimsiest pretexts.

There runs through the selling branch of the business a positive mania for gallonage as though nothing else mattered. Like the merchant who sold all goods below cost in the hope of making his profit on his volume of business, there seems to be a naive belief that bulk is the only thing that counts.

It is futile to make the independent the scapegoat, and to talk of "bootleg" gasoline, so long as large and reputable companies maintain a fixed policy of allowing margins to a large class of buyers which enable the latter to charge retail prices considerably under the established service station level.

Unquestionably under this system the tank car or tank wagon buyer makes a rapid turnover which yields him a far greater profit than the refiner, and amounts actually in some cases to more than the refiner receives for his product.

Price cutting usually begins with some dealer who holds contracts calling for commercial discounts that enable him to trim his selling price without suffering an actual loss. He adopts this means of drawing trade from his competitor on the opposite corner or down the street who perhaps is selling a brand that is better known or more widely favored. The ultimate result of such a situation must be the elimination of all profit from the sale of gasoline.

The Code of Marketing Ethics unquestionably was a step in the right direction, but it appears to have stopped short of the point necessary to bring this situation under control.

Since the number of big marketing organizations is limited it seems altogether probable that a few executives could provide a powerful corrective by narrowing these margins or differentials to a point which would remove the incentive for the initiation of price cutting. This step, coupled with a reduction in further special discounts to big buyers, undoubtedly would produce a far more wholesome atmosphere, the full benefits of which would become operative at the expiration of present contracts.

It might be interesting to examine some of the more obvious reasons why this is not done. Strangely enough one of them appears to be the fact that many units in the business have grown so large that it is difficult for men at the top to see what is going on, or at least to grasp its true significance. Then too, the fact that some members of the industry had to be chastened by the federal government in their earlier years seems to have a paralyzing effect on the exercise of initiative in matters of trade practices. The industry is afflicted with leaders who dare not lead.

The oil industry is not a monopoly today and need not fear accusation on that score. Without illegal concert of action it is possible to correct the present deplorable situation. If a handful of leaders have the courage and initiative to put their own houses in order the price cutter will be deprived of his lever and fulcrum.

Unfortunately for their stockholders many of the men on whom this grave responsibility rests view the situation fatalistically, as though the industry would ultimately emerge from its ordeal purged and improved by the process. They comfort themselves with the strange philosophy that their companies are strong enough financially to survive a war of attrition. It unfortunately is true, however, that conditions like those existing in the oil industry often tend to become chronic. Even though recovery ensues it will not be easy to attract fresh capital from the public with which to repair the damage.

A more reasonable assumption is that, if these leaders blindly or deliberately embrace chaos, an aroused public opinion will ultimately insist upon federal regulation of this industry. If such regulation comes it will be undertaken—as in the case of the railroads—solely from the viewpoint of the public's interest.

It is scarcely necessary to dwell on the future troubles that present unremunerative prices are piling up for the industry. It is easy enough to reduce prices; when the time comes to put them back where they belong the need will be politically capitalized. Many responsible men have long been concerned with the increasing sales taxes being levied on the product. Continued low prices are a standing invitation to the states to increase their revenue from this source.

European oil leaders are baffled by their failure to bring about international cooperation. Accustomed as they are to orderly regulation through cartels, they are unable to understand the spectacle of the American petroleum industry sawing off the limb on which it sits.

Soviet's Official Answer to Royal Dutch

Russian Oil Industry Replies to Dutch-British Oil Company's Comments on U. S. S. R. Operation of Confiscated Petroleum Properties.

. . .

By N. Tolstonogov
Consulting Economist
Soyuzneft, Moscow.

IN WORLD PETROLEUM for June last there was published the annual report of the operations of the Royal Dutch Petroleum Company and its subsidiaries, in which attention was drawn to its enormous funds invested in commercial facilities in Russia that had been confiscated by the Soviet authorities without compensation following the revolution. The present Russian Soviet Government takes issue with the Royal Dutch-Shell comments on the operation of the oil fields and refineries under the new regime, and has specially prepared an official answer for publication in this journal. In publishing its reply WORLD PETROLEUM presents the case of the Soviets without any endorsement of the opinions or other statements expressed but as a matter of fairness to both sides.

THE annual report of the Royal Dutch-Shell Company for 1929, submitted at the meeting of stockholders in Amsterdam on June 20, 1930, and published in WORLD PETROLEUM for June, 1930, contains a special section devoted to the oil industry of the U. S. S. R.

In this section of the report the Board of the Royal Dutch-Shell Company maintains that the results attained by the state oil industry do not come up to those attained by private companies. The report claims in particular that: (A) the workers in the oil industry of the U. S. S. R. receive lower wages than those in the privately-owned oil industry of other countries; (B) the results obtained by the Soviet Government are inferior to those obtained in otner countries; (C) the financial results also compare very unfavorably with those of "our" private enterprises. The section concludes with the oft-repeated assertion that the development of Soviet oil export is taking place at the expense of the domestic consumer.

The Shell report gives an entirely incorrect picture of the real situation in the Soviet oil industry. We present facts and figures to substantiate this.

I. In an endeavor to prove that the workers in the Soviet oil industry receive lower wages than those employed by the Shell Company, the report for some reason refers to an article by Mr. Lomov published on January 28, 1926, in the IZVESTIA. But, during the past few years, the situation of the oil workers in the U. S. S. R. has improved fundamentally, as will be seen from the accompanying table. (Bottom of page.)

In the article in question, Mr. Lomov admitted that the average wage for Azneft for the first half of 1924/25 was about 16 per cent lower than the pre-war wage. But the figures given above show an increase in wages during the five-year period 1924/25 to 1928/29 of 52 per cent for Azneft, and of 39 per cent for Grozneft. Obviously the present wages of the oil workers considerably exceed the pre-war wage. Moreover, it must be remembered that before the war the oil workers had a 12-hour day, whereas under the Soviet system the majority of the workers now enjoy the 7-hour day. Also, it is necessary to state that during the last several years the Soviet Oil Trust have expended many millions of rubles in building houses for oil workers; have built special railroads in Baku, Grozny and Emba for their transportation; have extended social insurance and cultural services (baths, dining-rooms, creches, hospitals, libraries, etc.). I. Trone, Vice-President, International General Electric Company, made the following statement in the course of a speech delivered at the Institute of Politics held at Williamstown, Mass., August 1-2, 1930: "I knew Russian labor conditions in 1917 and 1918, when men working in the oil fields lived like cattle —there is no other expression! They lived not in houses, but in sheds, often with earthen floors. There was no such thing as accommodation for a bath, and drinking water was brought over from a few hundred miles away. They now have garden cities, beautifully constructed dwellings, a fine water system, gardens and plants. It is now a dwelling place for human beings. I am not talking economics, but I am talking of human beings and this is the thing they have done."

If the actual amount spent on these things is taken into proper consideration, the conclusion that the oil workers now have a much higher standard of living than before the war is indisputable. In 1929-30 wages in the Soviet oil industry continued to rise.

II. As proof of the inability of the Soviet oil industry to manage its affairs the Shell report brings forward the fact that the oil syndicate had to call on the Standard Oil Company of New York to set up an installation at Batum for improving the quality of their export kerosene. To rely on this fact for proof in 1930 would indicate that Shell is completely uninformed on the Soviet oil industry. The fact is, that subsequent to the purchase in 1927 of the above mentioned installation (which was very small, the cost being not more than a half-million rubles), the Soviet oil in-

AVERAGE MONTHLY WAGE IN RUBLES IN RUSSIAN OIL INDUSTRY

	1924/25 (first half)	1925/26	1926/27	1927/28	1928/29
Azneft	60.27	70.04	76.26	82.75	91.04
Grozneft	60.00	61.15	73.80	75.71	83.70

dustry has carried out an intensive program of construction of new refineries and has enlarged the capacity of the old ones. During 1926/27 to 1929/30, inclusive, 177,600,000 rubles ($91,500,000) were spent on the refining end of the industry. As a result of these capital expenditures the capacity of the plants has been greatly increased. This made it possible to attain in 1929/30 a total of 14,487,500 tons (101,412,500 bbl.) of oil refined as against 5,702,400 tons in 1913. The percentage of raw products refined to the total oil output rose from 65 per cent in 1913 to 84.7 per cent in 1929/30.

In addition, several plants have been built during the last few years for the production of lubricating oil and bright stocks. Also a number of cracking plants are now nearing completion for the production of gasoline. The Five-Year Plan for the oil industry provides for many such installations, some parts of which will be manufactured in the U. S. S. R. Obviously under these circumstances it is quite naive to cite the purchase in 1927 by the Naphtha Syndicate of a small refining plant costing a half-million rubles as proof that the Soviet Government is unable to manage the oil industry.

III. The Shell report asserts that the results obtained by the Soviet Government from their rich fields are very poor in comparison with those obtained in other countries. It comes to this conclusion by comparing the increase in production from 1916 to 1929 of the Dutch East Indies oil industry—which, as is well known, is a young, rapidly developing industry—with that of the Soviet Union, where the largest fields (Baku) have been in operation several decades. It would be more correct to compare production in the Dutch East Indies with our Grozny region, which also is of recent development. The comparative production is as follows:

	1916	1929
Dutch East Indies.	1,678,900 tons	4,746,400 tons
Grozny	1,645,000 tons	4,648,300 tons

From the above table it can be seen that development in the Grozny region by no means falls behind that in the Dutch Indies.

Attempting to prove a slow development for Soviet oil production as compared with that of its fields in the Dutch Indies, the Shell report conveniently ignores the fact that in 1929 the increase in production of the Soviet fields considerably exceeded the increase in production of its own fields. In the U. S. S. R. the increase over 1928 was 16.1 per cent; in the Shell fields it was 14.1 per cent. World production increased only 12.2 per cent. Production in 1928/29 in the U. S. S. R. increased 86 per cent, in comparison with 1913 (the last pre-war year), and is four times as great as that of the first year after nationalization (1920/21).

IV. It is futile to dispute the statement of the Royal Dutch Shell Company that the financial results of our State industry compare very unfavorably with those of their private enterprises. The Soviet oil industry, being an integral part of a single planned State economy, does not aim to make as much money as possible, but rather to satisfy the definite needs of the national economy of the Soviet Union. Moreover, the Soviet oil industry does not pay dividends and, therefore, it is impossible to make comparison in this respect. A comparison, however, of the percentage of profit to cost of production of the Soviet oil industry with the pre-war percentage shows that the present percentage, despite large appropriations for the Treasury, is the higher. According to S. and L. Pershke, the percentages of profit to cost in the refined oil industry for the three years 1909/11 was 40, 30.8 and 32.8 per cent respectively.

The Soviet oil industry as a whole gave the following percentages of profit to cost: 1926/27, 51.9 per cent; 1927/28, 50.3 per cent; 1928/29, 71.9 per cent. It is to be noted that in arriving at the figures of profit in pre-war years, S. and L. Pershke did not take into account the business-turnover tax and the "per cent" allowed for depreciation, whereas in the data given for the Soviet years these items were taken into consideration.

During recent years substantial capital investments have been made in the Soviet oil industry, as shown by the accompanying table.

SOVIET OIL INDUSTRY CAPITAL INVESTMENT

1925-26	1926-27	1927-28	1928-29	1929-30
140.3 million rubles	189.9 million rubles	218.8 million rubles	219.7 million rubles	342.7 million rubles

These investments have made it possible for the oil industry to extend its work of contruction of plants in the Baku and Grozny districts, as well as in the newly created refining bases at Batum and Tuapse. Drilling and exploration operations have also been considerably increased over pre-war figures. During these years the major pipe lines, Baku-Batum (822 kilometers) and Grozny-Tuapse (618 kilometers) were laid.

In addition to the considerable increase in production, very great results have been attained in the field with technical methods employed for production and refining. In drilling, the expensive percussion method has been replaced by the rotary method now principally used in America. By this method, and by Kapelushnikov's new turbine method, 84 per cent of all the drilling in the U. S. S. R. in 1929/30 was done, whereas before the war the rotary method was applied only on a small scale by a few more technically advanced firms. The change from steam to electricity, both in oil extraction and in drilling, has been almost entirely accomplished in the Baku and Grozny fields. In 1929/30 the electrified wells in Baku produced 99.5 per cent of the total non-gusher oil, and in the Grozny 91.5 per cent.

Finally, we have accomplished the change from the old bailing method to that of deep pumping. In 1929/30, of all the non-gusher oil only 3.6 per cent was obtained by bailing. The most important result of the rationalization of refining technique has been the increase in the percentage of gasoline and ligroin extracted from the crude oil. This figure will be 14.6 per cent in 1930/31, as against 2.7 per cent in 1913.

Another result of the introduction of new technical methods has been a considerable reduction in the cost of production and of drilling operations. For instance, in Baku the operating expenses in producing oil in 1928/29 amounted to only slightly over one-third those in 1923/24 (decreasing from 9.30 to 3.23 rubles), and the cost of drilling was only half as great.

V. In conclusion, it is necessary to refer to the statement in the Shell report that the export of oil from the Soviet Union could not have reached the present proportions if the oil industry of the U. S. S. R. had fully satisfied the home market. Such a statement could hardly have been made if there had been an understanding of the root of the planned Soviet national economy, of which the oil industry constitutes an inseparable, integral part. It is naive to think that the Soviet Government would reduce the scale of its work in railroad and water transport or in industry in general, or the scale of its tractor production, the development of which constitutes one of the technical bases for the collectivization of agriculture, for the sake of an exceptionally large increase in oil exports!

As regards the per capita consumption of kerosene in dwellings and for lighting purposes, the present figure considerably exceeds the pre-war one. This is a result of population growth.

International Oil Interests in Iraq

Government's Impatience at Slow Petroleum Development: Conservation by Procrastination. France Interested in the Crude for Her National Refining Program . . . By Alec. H. Day

LAST August may not take its place as one of the most important months in the history of petroleum, but it has probably witnessed developments which may have a powerful influence on oil production and marketing during the next few years. As already discussed in WORLD PETROLEUM, King Feisal of Iraq paid a visit to Britain and other European countries, and one of the most outstanding matters he discussed during his tour was the development of the oil resources of his country.

"Make haste slowly" is an excellent proverb, but there always are those who think that its application can be carried too far. King Feisal of Iraq and his advisers have evidently come to the conclusion that, in the case of Iraq oilfields, it has been carried far enough. A glance at the events leading up to the present situation will show why he considers he has grounds for the view that the country's petroleum resources have not been getting a fair show.

ONE of the great problems now facing the international petroleum industry is that of Iraq oil. Opening up extensively what is believed to be an enormous potential field will have a more disturbing effect on the immediate future programs of many companies engaged in world-wide producing, refining and marketing than will the Russian five-year plan. At present the crude in this field, partially proven could remain stored until needed in nature's vast reservoir. The Iraq government with Venezuela's profitable results before it has an eye on the revenue to be derived from active production; France wants the crude to assist its national refinery industry, while Germany will benefit from equipment orders and British interests are ready to do the financing.

Germany Interested Before the War

The history of Iraq oil commenced many years before the European War, when German interests in which the Deutsche Bank was largely concerned obtained boring rights throughout Mesopotamia as part of the Baghdad Railway concession. What they lost in this direction through the War still remains to be proved commercially, but it has been considered of sufficient importance to provoke a good deal of international wrangling since the German interest in Iraq was eliminated. Questions of the "open door in Iraq," which received so much publicity during the years immediately following the Armistice, revolved largely round the possibility that the country possessed oilfields of immense potentiality. British interests, represented by the Shell and the Anglo-Persian, had already got their teeth into the pear through their holding in a company called African and Eastern Concessions, Limited, registered as long ago as 1911. The name of this concern was changed to the Turkish Petroleum Company in 1912, and it thus formed the nucleus of the present internationally owned Iraq Petroleum Company. Original capital of a mere £50,000 was increased to £80,000 in 1912, following the acquisition from the Deutsche Bank of the original concession granted by the Turkish Government to work the oil deposits in Mesopotamia. The consideration for these rights was 20,000 shares of £1 each, so that the Deutsche Bank became a partner in the oil concession.

France Takes a Hand

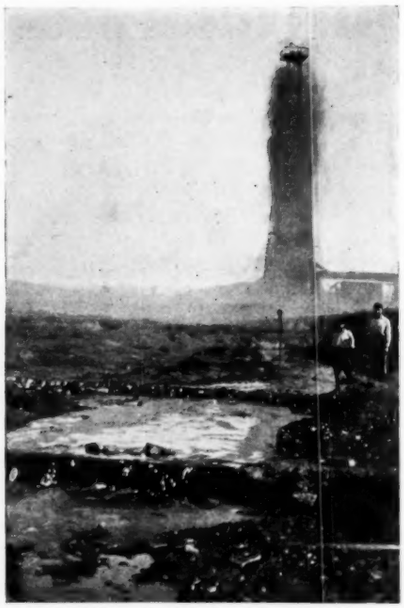
The German interest was eliminated as a result of the War, and the clamoring for an interest in Iraq oil by France and America finally induced the remaining partners in the Turkish Petroleum Company to let in new associates. Participations were taken by the Compagnie Francaise des Petroles, the nominee of a French group with a deep Government tint, and the Near East Development Corporation, owned by the Standard Oil Company of New Jersey, Standard Oil Company of New York, Pan-American Petroleum, Atlantic Refining and Gulf companies. These two groups, with the Royal Dutch-Shell and the Anglo-Persian, each hold equal portions of 23¾ per cent of the capital of the Iraq Petroleum Company. The remaining five per cent belongs to Participations and Investments, Limited, which is the nominee of C. S. Gulbenkian. In addition to possessing great wealth Mr. Gulbenkian is one of the World's brilliant oil men. His participation is due to his activity in originally securing the concession. His position is very strong.

Following the famous Versailles treaty, and the apportioning of Iraq oil rights in the above proportions, a convention was signed by the Iraq Government in March, 1925, granting the company a concession for 75 years, a period of three years being allowed for a survey of the country and selection of twenty-four plots of eight square miles each. It only remained for the company to prospect its territory, choose its areas, and commencing production. Over five years have elapsed, and the selection period has been extended, but apparently little has been done. Far from any large scale production being in sight, the company until recently had not even selected

its operating areas. It has increased its capital several times, to the present amount of £4,000,000 and changed its name in recognition of the setting up of an independent Iraq State, but has not got much further, although, in view of the long-headed interests behind it, it may be assumed that sufficient prospecting has been done to enable the management to lay hands on some of the best oil prospects in the country at short notice. Producing wells have been brought in, including one of 96,000 bbl. per day, but have remained capped for a long time pending provision of transport facilities. [See February, 1930, and September, 1930, WORLD PETROLEUM—Editor.]

The Pipeline Problem

The question of transport is one of the principal difficulties which the company has doubtless advanced as a reason for its inaction. It presents some very real obstacles to successful oil development. The selection of a route has itself been an acutely controversial international problem, since the British interests in the Iraq Petroleum Company, held through British Government participation in the Anglo-Persian Company, naturally want the pipeline to run to the Mediterranean through Palestine, while the French insist on a route through Syria, a French mandated territory, provided that this route could be proved as practicable and economical as any other. Pipeline construction possibilities in Iraq were discussed in the British Parliament not long ago, while the interest taken on the French side is shown by a report made by M. Henri Berenguer, Chairman of the Foreign Commission of the French Senate. The following is a translation of extracts:



A river of oil flowed for seven days from Babu Gurgur No. 1 before it was brought under control.

"The results obtained by the Iraq Oil Company, notably in the region of Baba-Gurgur, confirm previous impressions that the Mosul oilfields are the richest in the world."

"A mission was appointed in 1927 to study the construction of a pipeline from the fields to the Mediterranean. A further mission, including English and French engineers, studied the project, and reported to the Iraq Company in December, 1929. It is known that the mission concluded that the pipeline should have its termination in Syria."

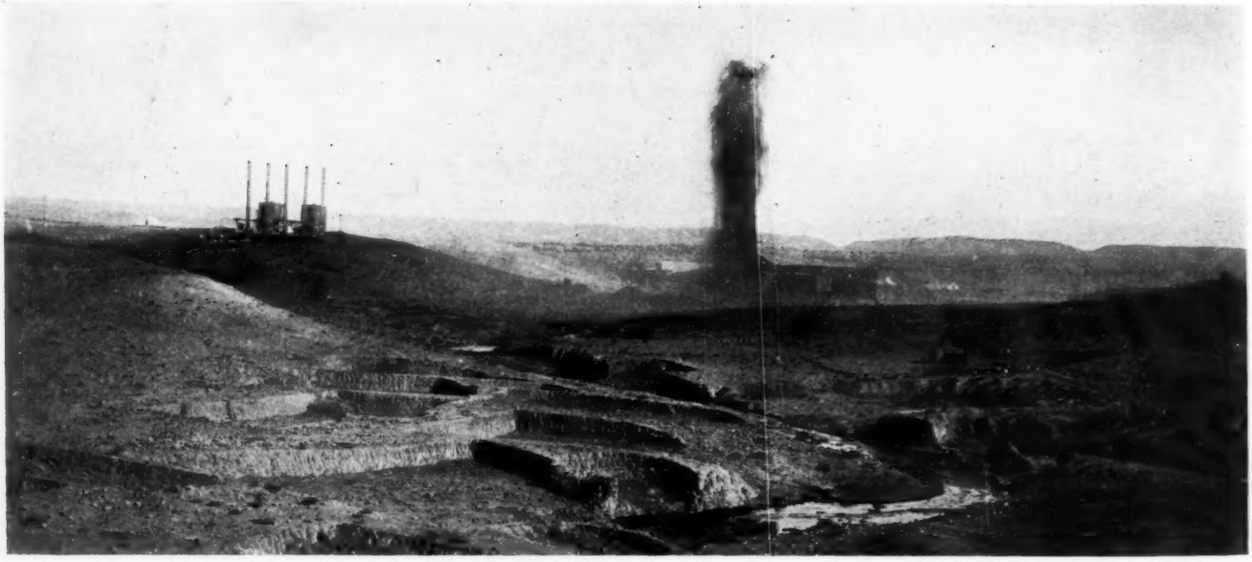
"This route is the shortest, and saves much expense in construction. It is necessary to consider the probable view taken by the Concessionary State, and to examine the attitude of the Governments of Syria and Palestine in regard to taxation, labor, railway construction, transport charges and land purchase."

"If it is proved that the Syrian route is most economical and presents guarantees equal to any other, ... this route should be adopted."

The foregoing indicates one of the problems concerning pipeline construction, but apart from the question of route, the actual laying and maintenance of a pipeline through soil consisting largely of loose sand, liable to disturbance by wind, and subject constantly to tropical temperature, is not to be undertaken lightly, as witness the difficulties of construction and maintenance encountered by the Anglo-Persian Oil Company in its line to the Persian Gulf.

Financial Backing

Great as the difficulties are in this and other respects, there is no reason why



General view of Iraq oil field showing Babu Gurgur blowing wild 96,000 bbl. per day of excellent quality crude oil from 1,500 ft. depth.

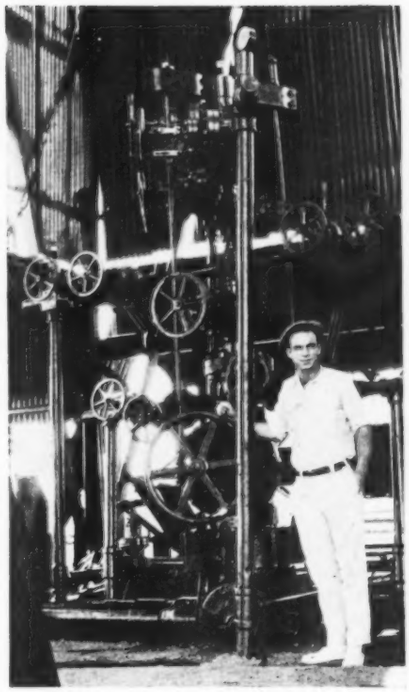
the undertakings interested in Iraq oil should not have surmounted them, had it been desirable to produce oil in commercial quantities. The issued capital of the various companies behind the Iraq Petroleum Company runs into hundreds of millions sterling, and represents only a fraction of the total resources at the disposal of the combined groups. In addition, the Company must command the finest technical advice in the world through the staffs of its members, and the latter have on former occasions found means readily enough of working together when they found their interests running parallel.

One obvious reason for delays in Iraq is a disinclination on the part of the controlling oil groups to develop the resources of the country at the present time. Today there is far too much production in the world and the evidence indicates that production has not been hurried because it might swamp the overflowing market with Iraq oil.

Rival Development Company

Whatever the facts of the case, the attitude of dalliance could not be expected to continue indefinitely without competitors appearing on the scene. The principal of these is the mysterious British Oil Development Company, originally headed by a rather unusual oil magnate —an admiral of the British fleet. People who try to find this company in the usual works of reference are disappointed. Its name appears modestly, far from the word "British," under the title of "B. O. D. Company." This concern was registered in March, 1928, "to acquire and deal with oil and mineral-bearing properties." Sir Edward Manville, chairman of the Phoenix Oil and Transport Company, is chairman, and the board includes Admiral the Rt. Hon. Lord Wester Wemyss, and such well known industrialists as Sir Robert McAlpine, Sir John Latta, Lord Inverforth, and Sir Edward Iliffe, the trade journal publisher. Foreign groups interested include the Agenzia Generale Italiana di Petrolio, and a powerful German section including Krupp, Hamel & Wolff with a Swiss-French consortium including the Swiss Bankverein.

The B. O. D. group is evidently out to participate in Iraq oil partly for the sake of the large orders for equipment for the fields themselves, the pipe line, and the railway which would probably be necessary. These orders will naturally be placed by the group which is developing the fields. The British and German sections are stated to have arranged to take 50 per cent and 38 per cent, respectively, of any business of this kind, and the French group 12 per cent, while the Italians are stipulating for the employment of a large number of Italian engineers, technicians and workmen. The group has been trying to obtain a concession similar to that possessed by the Iraq Petroleum Company, or alternatively prospecting rights over territory not selected by the latter. It is prepared, moreover, to make a big cash deposit as a guarantee of its undertakings under any agreement reached.

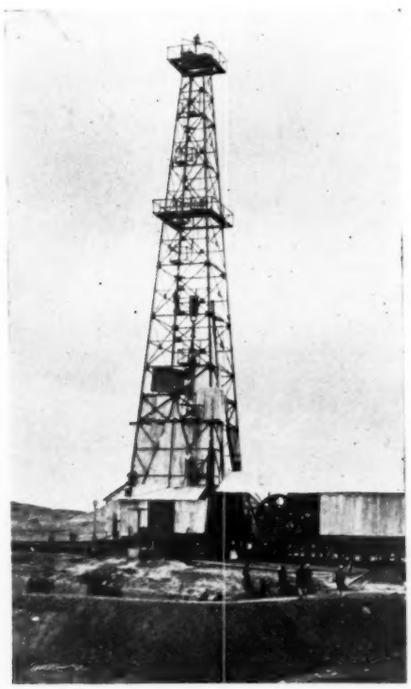


Xmas tree on Babu Gurgur No. 1.

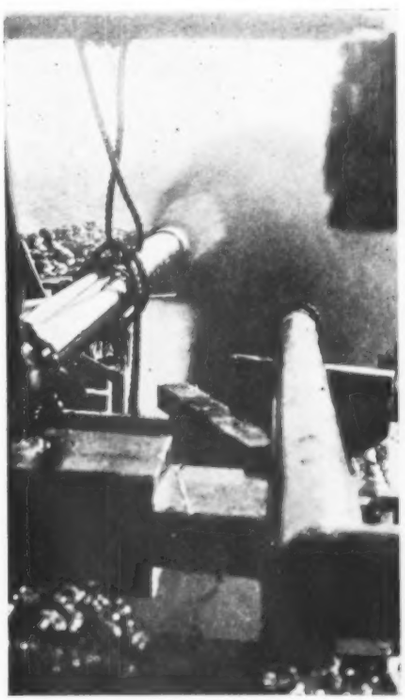
Activity in Sight

Impatience on the part of the Iraq Government to see the country's petroleum put to better use, combined with the intervention of the B. O. D. Company and other negotiators for development concessions, has evidently had the effect of hustling the Iraq Petroleum Company into at least an appearance of activity. Just before the visit of King Feisal to Britain the company started advertising for drillers, and it has since been reported that preliminary arrangements are being made for a railway and pipeline to span the 400 miles through Transjordania from Badhdad to Haifa, in Palestine. This report, however, has been promptly denied by the Compagnie Francaise des Petroles, the French end

American drillers were used to produce Iraq oil in commercial quantities. Palkanah No. 1.



Flowing 96,000 bbl. per day, a satisfactory answer to the question — "Is there oil in Iraq?"



Starting drilling operations at the Palkanah field, Iraq.

of the Iraq Petroleum Company.

Exactly when and how the question of Iraq oil will finish, it is at present too early to determine. Negotiations and projects will probably be shrouded in mystery, as they always have been. Looked at from one standpoint, the Iraq Petroleum group can easily be made the villain of the piece. Of the big interests identified with the company, the French group would doubtless be quite willing to see oil produced at the earliest possible moment—always provided that it were carried over a French mandated country.

France and Iraq

Iraq crude 35 degs. A. P. I.

Oil from Iraq would provide France with an additional source of supply for her national refinery program. The American, Anglo-Persian and Royal Dutch-Shell interests naturally look at the question from a different angle, and probably prefer to avoid disturbing the European and Mid-Eastern markets for petroleum products by leaving Iraq undeveloped until there is a much greater demand for crude. If, between them, these interests have moved too slowly, it is doubtless primarily in view of present overproduction of petroleum, but those interests are largely identical with the interests of producers throughout the world. To the extent, too, that the economic use of petroleum resources is a subject for world-wide concern, delays in Iraq may have indirectly benefited consumers as well as producers. A case could even be made out for delaying Iraq production in the interests of the country itself, and it is still quite possible that when the oil resources of the land are fully developed, the product will realize a higher price than it would have done if energetic prospecting and development had been pursued by the Iraq Petroleum Company immediately after the 1925 concession was granted.

But the present attitude of the Iraq Government is easy enough to understand. The oil is evidently there, and in present circumstances it is of no more commercial use to the country than it was five years ago. No relatively poor nation is content to see great natural resources locked away indefinitely, or to submit to being dragged into a scheme for world oil conservation while other nations are prospering through oil royalties and through the general development necessary by oil companies in operation. The curtain may soon go up on the next act of this interesting oil drama.

▼

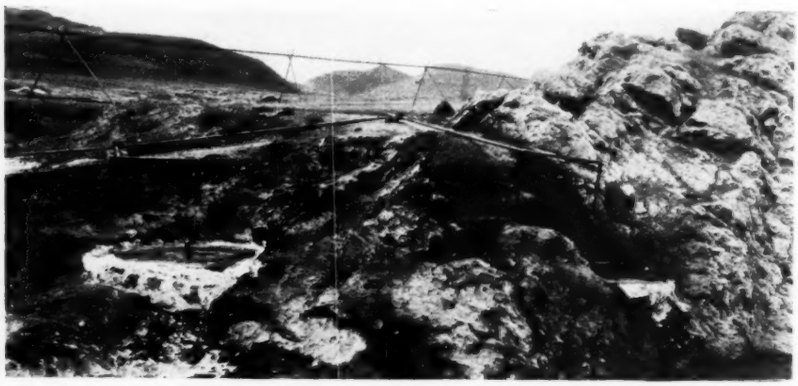
Petroleum Resources of Iraq

THE Colonial office of the British government has just issued a report on the development of oil resources in Iraq during 1929. According to this report the Iraq Petroleum Company last year drilled a total 43,748 ft, at 21 main locations. Since the beginning of its operations the company drilled up to the end of 1929 a total of 76,175 ft., or more than double the minimum footage required by its concessions of 1925. Oil in large quantities has been discovered in 11 wells, chiefly on the Baba Gurgur structure, north of Kirkuk. Other areas are very promising, but the difficulties of high pressures and moving formations will have to be overcome. The field headquarters of the company are at Tuz Khurmatli, and a small refinery has been erected at Baba Gurgur to produce petroleum products for the company's own operations. During the year 266,000 bbl. were refined. At Sulaiman Beg. the Iraq Petroleum Company has erected a power-house, machine shops, etc. A club house has been erected at Tuz Khurmatli, as there are employed in Iraq 128 Europeans and 47 Americans, in addition to 1915 Iraquis, 177 Persians and 88 Indians.

Marketing and production in Iraq was carried on during 1929 by the Khanaquin Oil Company, subsidiary of the Anglo Persian Oil Company, although its drilling operations in the Naft Khana field were suspended last year. Further developments of the latter field will not be carried on until the decision regarding the construction of the pipeline Haifa, Palestine, is decided.

From existing wells in the Naft Khana field a production of 525,000 bbl. was obtained in 1929, and royalty was paid on the same to the Irak government. Test drilling will shortly be re-commenced on the Chia Surkh field where drilling operations were suspended in 1924 due to high pressures.

Two seepages at Palkanah which furnished fuel.



Economic Aspects of Unit Operation

Unitization Offers the Most Promising Means Available for Placing Crude Petroleum Production on a Sound Economic Basis.

. . .

By Joseph E. Pogue

Consulting Engineer
New York, N. Y.

LONG known as an authority on petroleum matters, Mr. Pogue has taken advantage of the Tulsa Show meeting of the Mining and Metallurgical Engineers to analyze the major factors causing the present overproduction of oil in the United States. Realizing the need for changing existing oil laws which permit legalized robbery, and the great obstacles in the way of such changes, he believes that unitization of oil pools offers the most sound and economic solution of overproduction, as well as a means to bring drilling costs to a point below that of the Persian and Venezuelan oilfields. Results in the Yates pool are offered as an example of what can be done by intelligent exploitation of America's vast natural resources, and could well be followed by fields in California and Oklahoma.

THERE are two methods employed in the development of oil pools. The older and dominant method is one in which the primary object is the protection of the underground deposit from drainage through competing wells, and considerations of efficiency of extraction and cost of production are subordinated thereto. The newer and less prevalent method is one in which maximum efficiency and minimum cost are the first objectives and developments to these ends may proceed undisturbed by the exigencies of competitive drainage.

The second method has developed mainly in pools under single ownership, and the term "unit operation" has come to be applied to this procedure. A single ownership is not essential to the method, for unity of operation may be achieved by agreement under split ownership, or even by a concert of enlightened purpose. There are examples of unit operation where neither the ownership nor the management is a unit, but merely where unity of procedure has been attained, as is the case of the Yates Pool. Throughout this paper unit operation is used in its broad sense without implying sole ownership or single management, although unit operation is more conveniently attained where those conditions are present.

Competitive Development of Oil Pools

It is evident, upon reflection, that the second method should yield results far superior to the first, for the work of exploitation can be conducted without extraneous considerations and the natural forces present in the oil reservoir can be utilized to maximum advantage. Experience has amply confirmed this conclusion and were the facts widely known and appreciated, the efforts to extend the applications of the principle of unitization would be greatly intensified.

It has come about that the vast majority of oil pools, or reservoirs, in the United States are subdivided by numerous surface tracts under separate ownerships. This condition arises from the prevalent practice in the oil business of acquiring prospective acreage in checkerboard spreads. Thus the discovery of oil usually reveals a mosaic of overlying ownership. Since oil is a migratory mineral and is subject to lateral movement where pressure is relieved by drilling, it follows that the oil originally confined within the vertical extensions of the property lines may be partly drained by operations on adjacent acreage. The law offers no protection to the underground property along its vertical boundary planes and hence the owner of the oil is forced to set up, by drilling, drainage gradients equal to those of his neighbors, or else suffer the legalized robbery of his property. In imposing upon the owner of oil property the responsibility of defending it from drainage by outsiders, the law places an intolerable burden upon the interests concerned with the efficient production of crude petroleum. The combination of subdivided ownership and an archaic law sets the tempo of crude oil production in the United States, and constitutes a serious obstacle to orderly and efficient production.

The prevalent method of producing crude petroleum has the characteristic of intensifying competition and hence of speeding up the rate of output. It results in the waste of oil and gas, makes impossible the application of the best engineering practices, and leads to difficulties in adjusting the supply to market requirements. In consequence, costs of producing oil under intra-pool competition are unduly high and place the operators involved in this method at a disadvantage. During the pioneering period of the oil industry the drawbacks of competitive development within the single oil pool were overlooked, but in recent years a growing understanding of the objectionable features has become evident, and now the counter method of unit operation is receiving widespread consideration.

Unit Operation

One of the earliest discussions of the economic significance of unit operation is found in a publication issued by the Smithsonian Institution in 1918* from which the following citation is taken:

"By some means production must be

* Chester G. Gilbert and Joseph E. Pogue, Petroleum: *A Resource Interpretation*. Bulletin 102, Part 6, U. S. National Museum, Washington, 1918.

Persian oil field at Masjid-i-Sulaiman, showing Anglo-Persian headquarters in center. This is one of the most perfect examples of controlled production.

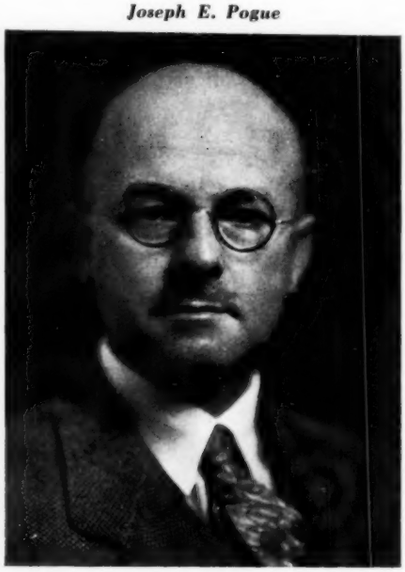
brought under the control of legitimate demand. A constructive policy . . . will encourage a type of development that will hold petroleum in the ground until it is . . . needed . . . The first step toward this end would logically be to disfavor small holdings. In the case of the public lands, this could be accomplished by appropriate legislation permitting the patent or lease of adequate acreage. In the case of private oil lands . . . a constructive policy will favor and facilitate integration, at least up to the point where each geological unit is occupied by a single producing activity . . . The elimination of excessive competition in oil production, that is to say, of competition within the geological unit or reservoir, will go far toward placing petroleum on the same footing with other mineral products . . . It will strike to the roots of wasteful production and overproduction by enabling the producer to gain greater profit in holding the oil underground until needed and then producing it according to the best current technique than by rushing headlong into hasty production as is necessary under present circumstances. It will create conditions of supply that will cater indifferently to inferior uses, to the sustained benefit of all activities actually dependent upon the distinctive character of petroleum products. In a word, this simple expedient will prevent the migratory character of petroleum from working at severe cross-purposes, as it now does, with the best interests of the petroleum industry and the public."

During the past few years the principle of unit operation has attracted growing attention in the petroleum industry, and this matter has received careful study at the hands of many individuals as well as by such organizations as the Federal Oil Conservation Board, the American Petroleum Institute, and the Petroleum Division of the American Institute of Mining and Metallurgical Engineers. The contributions of Henry L. Doherty to the subject have been particularly outstanding. In the meantime the practice of unit operation has got under way until now there are many examples of unit pools in the United States, although their aggregate output is still under 10 per cent of the total production of the country. In foreign countries, where circumstances of discovery are different, the small land holding is much less prevalent, and the yield from unit operations exceeds the competitive production almost two for one. [We recently interviewed Mr. Doherty who considers that co-operative drilling of oil areas offers a practical solution of the indiscriminate and uncontrolled production problem—*Editor.*]

Present Conditions in the Industry

Because of a train of causes, including rapid advances in technology, unsound economic policies as to price and inventory accumulation, and intra-pool competition, the supply of crude petroleum has been stimulated far beyond the requirements of the market and the economic expedient of proration has developed to withhold the drilled-up supply from surface storage. In consequence a vast "potential" of crude petroleum has banked up, only a turn-of-the-valve removed from the market, while drilling still continues. The presence of this large potential constitutes the most striking aspect of the current petroleum situation and creates a new and unsolved problem for the petroleum industry. The mere presence of a large potential is evidence that the cost of producing petroleum is too high, for expenditures on drilling and other aspects of production are greater than needed to balance supply and demand. The economic effect of the potential is to raise the cost of production, to reduce the rate on return on the capital employed, and to create low prices for the commodity. The existence of a large potential, furthermore, reacts unfavorably upon the refining and marketing departments of the industry, for this poorly controlled surplus at the raw material source operates to create an excess expansion in refining and distributing facilities.†

Joseph E. Pogue



These conditions are undesirable and harmful to the progress of the industry. The remedy for them is difficult under present practices, but the avenues toward improvement are clearly marked. To bring the production of crude oil to a sound basis will require the elimination of the potential, or at least the uneconomic portion of the potential; a radical reduction in production costs; and the exclusion of methods that create waste, either of oil or gas. These three desiderata are closely related and it requires no extended discussion to indicate that unit operation of oil pools offers the most promising means for bringing about these improvements. Conversely, the existence of these maladjustments is creating economic forces which will slowly work to favor the corrective changes.

†It should be pointed out that there are two types of potential: (a) the potential resulting from excessive drilling in competitive holdings, and (b) the potential caused by the procedure of flowing wells under back pressure to gain a more efficient operation. The former is uneconomic; the latter may be present in a well conducted unit operation.

The industry has long considered the advisability of building up an adequate crude-oil reserve as a stabilizing factor in the business. Of late years the advances in the technique of search have led to a marked acceleration of discovery and consequently to the creation of a sizeable reserve. But because of competitive drilling requirements, this reserve has taken on the nature of a drilled-up potential instead of a true reserve, and therefore is proving disserviceable. The proper objective would be a *reserve without a potential.* The elimination of the potential with its whole train of unfavorable influences can scarcely be accomplished without a new method of production which will permit discovery without involving the immediate necessity of overdrilling.

Only under conditions of monopoly or of shortage can consideration of cost be ignored. It is well known that the costs of producing crude petroleum vary over a wide range according to depth, location, type of deposit, and so on. It is not so generally appreciated, however, that the method of production followed is even more important than the physical features. It is not a coincidence that the lowest-cost oil in the world (i.e., Persia, Venezuela, Yates) comes from fields in which unit operation is practiced. Under conditions of oversupply, the matter of costs becomes of paramount importance, for a falling price level leaves high-cost producers floundering in red ink. Conditions now prevailing in the United States are bound to emphasize the importance of production costs and to favor all means that will lead to their reduction.

A shift in demand is going on in the direction of low-cost sources of supply and this adjustment cannot be successfully combated by artificial barriers, but only by a lowering of costs on the part of the high-cost areas. As an example, the Oklahoma City pool, a high-cost field with costs accentuated by its method of development, cannot hope to compete with the Yates pool, a low-cost field with costs additionally lowered by an intelligent plan of exploitation. When we speak of competition from cheap foreign oil we should have in mind the superior production methods employed in most foreign fields, for with proper operating procedure in this country American oil could meet competition on an equal plane wherever the transportation differential was not adverse.

A third consideration, involving the public interest, is the waste of oil and gas incidental to competitive development of oil pools. This is a matter that touches the responsibilities of both our State and Federal Governments, and the activities of the Federal Oil Conservation Board, the Oklahoma Corporation Commission, and the Texas Railroad Commission, not to mention the passage of the Texas Pipe Line Law and the California Gas Law, should be sufficient evidence that these responsibilities will not be treated lightly.

Prospective Course of Unit Operation

Unitization, like any other method of accomplishment, is an evolution. Whether this method will eventually entirely supersede "competitization" in this country, or how rapidly it will progress, are doubtless questions that cannot be answered now. Theer are a number of factors that appear to be accelerating the application of unit operation and there seems to be no early prospect of any change in the incidence of these forces. These factors are five in number: (a) The effect of differential cost, (b) the consequence of differential extraction, (c) the resultant of large-scale operations, (d) the need for a nationalization of supply, and (e) the matter of the public interest.

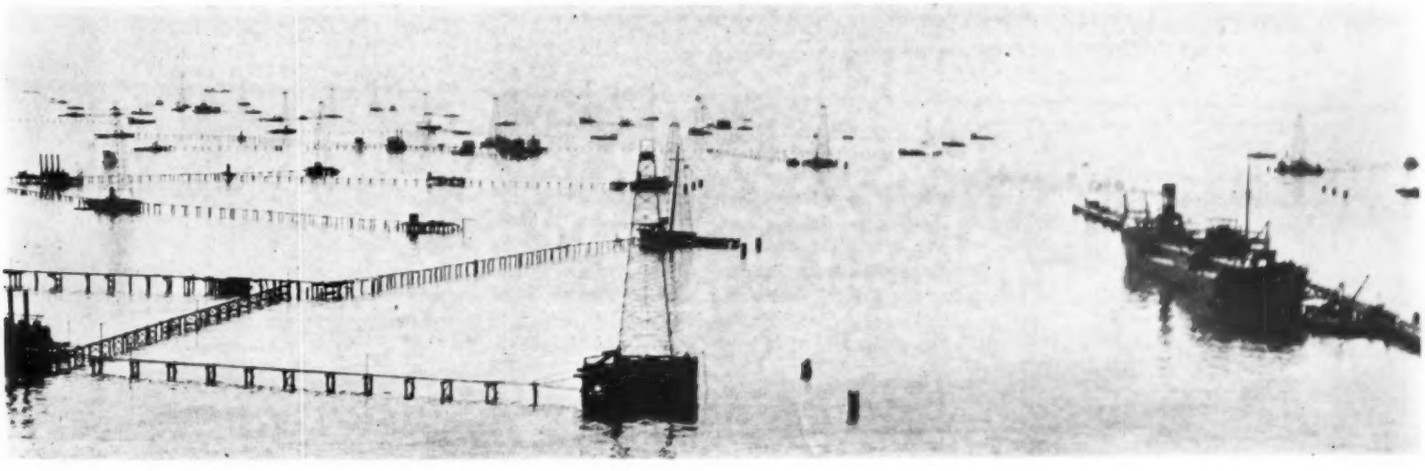
The lowered costs arising from unitization as compared with competitive development places a substantial economic advantage in favor of the newer method. As time goes on, competitive pools will find it increasingly difficult to contend with unitized pools. Already this rivalry is being actively felt in respect to low-cost foreign sources of supply, and the United States will find it difficult to maintain its place in foreign markets without unitization. In this country, the same struggle is going on between the two methods, though as yet in a less conspicuous degree, and the reason that Oklahoma is forced to consider successive reductions in the State's allowable production is to be traced, in part, to this consideration.

Competitive pools are being developed and depleted more rapidly than unitized pools, and this process shows no signs of abating. Projected to its logical conclusion, this tendency will ultimately result in a dominance of unit operation.

Large-scale activities in the oil industry tend to make for a type of exploration that results in spacious land-holdings, and this tendency is accentuated by the newer methods of prospecting. The drift toward combination and merger, conspicuously in evidence in the petroleum industry, will further this propensity. It may be expected that an increasing proportion of our future pools will be reduced to ownership in unitized blocks.

The growing attention paid to the necessity of rationalizing the supply of crude petroleum is forcing attention to all means whereby this may be accomplished. As a result, the influence of constructive thought in the industry will facilitate the spread of unitization.

Finally, the accomplishments of unit operation, both in practice and in theory, appear to fit so closely the public interest as expressed by the policy of the Government through the Federal Oil Conservation Board and State Commis-



Spacing of oil wells is both controlled and sensible in Venezuela.

sions, that a strong influence in favor of the efficient method is set up in the field of public policy.

Forces Retarding Unit Operation

The trend toward unit operation is opposed by the forces of inertia, as exemplified by the small producing interest, the traditonal practices in the industry, and the laws surrounding the exploitation of oil and gas. Of these, the most inflexible is the legal factor. The irrationality of the law of oil and gas is now coming to be generally recognized, but there is no concert of opinion as to how this law may be changed. In fact, there is probably as yet no approach to unanimity of opinion that it should be changed. Yet the law of oil and gas, which in effect legalizes robbery, is manifestly so illogical, so unsound, and so opposed to the common law as related to other property rights that there is justification for believing that it is unconstitutional and would be so interpreted if brought to an enlightened test before the United States Supreme Court.

Conclusion

(a) Unit operation is developing as a superior economic method of producing crude petroleum.

(b) Unit operation offers the means for reducing costs, eliminating waste, and gaining the economic advantage of a *reserve without a potential.*

(c) The progress of unitization is being facilitated by the principle of differential cost, the principle of differential extraction, the drift toward large-scale operations, the need for rationalization of supply, and the public interest in conservation.

(d) Progress in unitization is opposed by custom and the archaic law of oil and gas, which may be subject to change.

(e) Unitization offers the most promising means available for placing the production of crude petroleum on a sound economic basis.

▼

Gasoline Price Lowered in France

THE sudden decision of the Chambre Syndicale des Raffineurs to lower the price of gasoline by frs. 5.—an hectoliter came as an unexpected and welcome surprise to the French public on the eve of the Salon de l'Automobile (Motor Show).

The Chambre Syndicale undoubtedly came to this decision owing to the recent cut in prices in the United States, and for other reasons as well; while the latter are not obvious to the general public or to the outsider, they are of no small importance.

Since June the French daily press has been predicting a rise in the price of gasoline of Frs. 15.- per hecto. Consternation and indignation have been rife, but the rise is apparently justified—according to the Office National des Combustibles Liquides—on account of the elevated price of the alcohol which every importer of petroleum products is obliged by law to take over from the Office des Alcools, and to mix in equal quantities with his gasoline in order to obtain the so-called "Carburant National" used by lorries and other heavy vehicles.

The alcohol which the importers have to take over from the State is termed "Industrial Alcohol" and is manufactured from beet in the North of France.

The French Parliament—with an eye to the interests of the wine growers in the South of France, who also have large quantities of so-called "Alcool de Bouche" to dispose of, and who are more numerous and therefore more dangerous as electors, if adversely affected, than their northern brethren—saw fit to legislate and to dispose of the industrial alcohol in order that it should not be thrown on the market to compete with the alcohol produced from the distilling of wine; and this has been done to the detriment of the petroleum industry, which is obliged to increase the price of gasoline in order to recuperate the losses sustained by the acquisition of alcohol at exorbitant prices.

Since 1923 therefore the French petroleum importers have taken over varying quantities of alcohol from the Office des Alcools, these quantities could have attained 10% of their petroleum imports, but have so far fluctuated between 1 and 2%. Last year however, the wine harvest was so abundant that the State found it necessary to take over not only the usual amount of industrial alcohol, but also a considerable quantity of "Alcool de Bouche", and in order to dispose of it has contemplated obligating the petroleum importers to take over a larger percentage for the "Carburant National."

The "Carburant National" although more costly than ordinary heavy gasoline has to be sold at an inferior price; the petroleum importer therefore loses sums of money which vary according to the amount of alcohol he takes over, and the only way he can recuperate these losses is by increasing the price of gasoline.

The first of October had been selected as the date on which to raise the price of gasoline. Public opinion however, was so loud in protestation and the press raised such a hue and cry, that administrative powers thought discretion the better part of valor, and seized the opportunity offered them by the cut in prices in the U. S. to ask the Chambre Syndicale des Raffineurs to lower their prices in France, and to announce their decision in time for the opening of the motor show.

This as we have seen has been done, and at the same time the effects of the law obliging increased alcohol consumption will be postponed until the end of October, which will allow a little time for public opinion to calm down.

E. J. ANDRE.

▼

Petroleum Product Export Prices

AS foreshadowed in recent issues of WORLD PETROLEUM, the Export Petroleum Association, New York, or rather its individual members, have cut the price of gasoline and kerosene two cents and one cent per gallon, respectively, to the United Kingdom. The official export prices, however, will still be listed as 8 to 9½ cents. For cargoes to France, Germany and Belgium, the concession is 1½ cents on gasoline and one cent for kerosene.

During the first seven months of this year, 39,763,000 bbls. of gasoline (1,670,046,000 gallons) were exported from the United States, exceeding shipments in the same period last year by 4,727,000 bbls. regardless of the severe competition which diverted considerable business. Present listed prices for the Export Association are as follows: United States motor grade, 8 cents a gallon; 60-62 gravity, 400 end point, 9 cents; 61-63, 390 end point, 9¼ cents, and 64-66, 375 end point, 9½ cents; kerosene, water white, 7 cents and prime white 6 cents. These prices are f.o.b. Gulf Coast terminals, the quotations at New York being ¼ cent a gallon higher. The California seaboard prices are about 1 cent below the Gulf Coast quotations.

Oil Production Curtailment in Venezuela

Proven Wells in Major Competitive Fields Have Been Pinched in and Shut Down to Over 200,000 Barrels Under Their Actual Daily Capacity. Drilling Lessened Except Wildcatting. . . .

UNDER a gentlemen's agreement, curtailment of oil production in Venezuela has been carried on for some time, particularly in the Maracaibo field, where the major supply of that country is obtained. The MARACAIBO HERALD recently published a comprehensive list of structure wells drilling in competitive districts on August 1, 1930, compared with January 1st, 1930. Suspension of competitive drilling in the producing areas is now virtually absolute and the closing down and pinching-in of hundreds of flush wells at the risk of sanding up and lowering the ultimate yield per well, is brought out by figures that reveal existing conditions after the working agreement had been in existence for seven months from January 1st.

The Lago Petroleum Corporation, which is one of the three largest producers in Venezuela, does not have a single string of tools in operation either in the producing districts, on wildcats, or for testing the extent of known structures.

In connection with the curtailment movement in Venezuela, the Lago Petroleum Corporation has just submitted to the three other important operating companies, namely, the Royal Dutch Shell, Gulf Oil, and the Creole, a proposal that the production of oil in Venezuela shall be further reduced 9 per cent from the output as of October, first. The proposal was made by R. G. Stewart, President, Pan-American Petroleum and Transport Company, which controls Lago, following a request made to E. G. Seubert, President of the Standard Oil Company of Indiana, of which the Pan-American is a subsidiary, by mid-continent oil operators.

On January 1st, of this year, the Lago, Gulf and V. O. C. companies were drilling a total of 35 wells at the Lagunillas, La Rosa, Ambrosia and Punta Benitez fields of Lake Maracaibo. On August 1st only ten strings were in operation. In non-competitive producing districts in Venezuela, the number of structure wells being drilled by the Caribbean Petroleum, British Controlled, Venezuelan Oil Concessions, Colon Development, New York & Bermudez Company, and Tocuyo Oil Company, remained at 22 strings, as on January 1st.

This does not picture the entire drilling situation in Venezuela as production has been secured from seven other widely separated fields, but no exports were made from any of them prior to August 1st, so their output does not affect World production. Since that date, the Quiriquire Field in the State of Monogas, eastern Venezuela, The Creole Petroleum Corporation, entered the export list through shipment of the first ocean tanker load of crude on September 1st. This jungle field has long been under development, and when conditions in the oil industry improve is likely to become a scene of petroleum operations of major importance. It forms the twelfth oil field on a commercial scale in Venezuela. The draft at the bar is 20 ft. compared with 12 ft. at Maracaibo.

At present ten strings are in operation as against five on January 1st, so here there is increased activity. The Creole Company will hold a meeting on November 7th to increase the capital stock from 6,000,000 to 7,000,000 shares to further develop its Venezuelan properties.

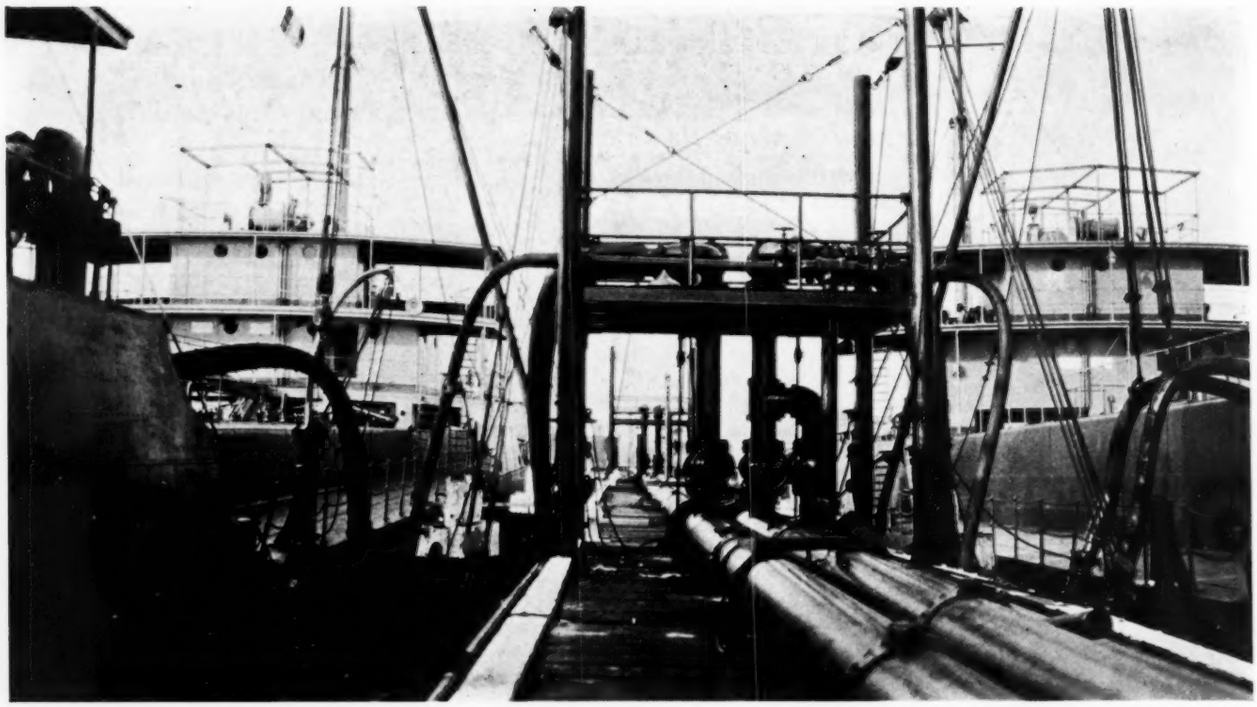
In the Rio de Oro and Los Manueles fields in the Colon district, several wells have recently been brought in. The first export shipment was made at the beginning of the year. For the week ending September 26th, the output was 104,119 bbls., or an increase of 10,000 bbls. over the average weekly production of the last few months of the Colon Development Corporation. Los Manueles field is generally regarded as part of the Tarra field.

In all but the strictly wildcat areas, a summary of drilling operations shows that there has been a decrease of 20 structure wells drilling, the number being 42 on August 1st compared with 62 on January 1st. It is very obvious that no attempt has been made to produce from the competitive fields anything like the maximum possible production. The estimated potential production from all wells now producing and from those which have been deliberately shut in or pinched, is about 593,300 bbl. per day. What has actually been produced is a total of 383,500 bbl. per day, or approximately two-thirds of the potential production. It is interesting to note that the possible production which was shut in entirely as of August 1st in 256 wells, or pinched in on wells being produced with only a percentage of their normal potential capacity, represents 210,000 bbl. daily.

Ambrosia, La Rosa and Lagunillas fields are highly competitive, as the bulk of the present Venezuelan production is being obtained from them. In this area alone 133,200 bbls. per day are either shut-in entirely or pinched-in, which clearly indicates the extent to which production and drilling activities have been curtailed by companies now producing and exporting on a commercial scale.

The known quantity of oil lands in Venezuela is, of course, enormous. It is only a question of additional drilling and transportation to produce oil on a similar scale to the United States, and undoubtedly there are many vast fields still to be proven by the drill. The number of dry wells has been exceedingly small compared with those in the United States. Out of a total of 1,478 wells drilled in the Ambrosia, La Rosa, Punta Benitez and Lagunillas fields of the Maracaibo Basin, but 67 wells proved to be dry or have since been abandoned. No fewer than 1,411 wells have been brought in as producers. In 16 other Venezuela fields, where oil has been encountered, only 183 were dry holes out of a total of 767 wells. Most of these dry holes were in the El Mene Field of the British Controlled Oil Field Company. This concern has been very unfortunate inasmuch as 43% of their wells were dry. Up to August 1st last, 2,245 wells had been drilled throughout Venezuela. Of these, only 250 were dry. So it will be realized that in Venezuela production, the Mid-Continent and California fields have too powerful a competitor to attack, for if Venezuelan crude is shut out of the United States by a high tariff, it will be diverted to the World's markets and make a serious hole

Sunset: Lake Maracaibo



Loading tankers on Lake Maracaibo.

in America's half-billion dollar petroleum export business.

It is believed by geologists that there is a vast pool of oil which practically extends beneath the entire Lake of Maracaibo, which water has a maximum depth of about 50 ft. The Lago have the concession for the lake area, except for narrow strips along the east shore. One test well has been carried out two miles from shore, but present active production is mainly from the shore area and from strips running along the lake.

On the west side of the lake, the only drilling has been wildcats. That the Société Française de Recherches au Venezuela, the French company making a bid for oil on a commercial scale, recently struck a 1,200 bbl. per day gusher of heavy oil on the west side of Lake Maracaibo, and at a depth of 6,270 feet, may mean active drilling in this new territory, as a number of other companies have holdings on which little or no wild-catting has yet been carried out. It had been considered by many geologists that the formation slopes down towards the center of the lake from the east side. It is possible, from this new showing, that the pool has its lowest point west of the lake. Oil on the east side is largely obtained from wells around 3,500 ft.

No pipe-line to the ocean has yet been laid, all oil being carried out of the lake in shallow-draft tankers. Now that the channel to the Gulf of Venezuela has been lighted, the combined capacity of the lake tanker fleets is a little under a half-a-million barrels daily. Altogether there are 78 tank ships in operation, with capacities ranging from 4,000 bbls. to 21,000 bbls., the average being around 16,000 bbls. Since 1917, over 400,000,000 bbls. have been shipped from Lake Maracaibo, and most of this the last four years. Production and exports will probably be slightly under the 1929 record figure of 135,000,000 bbl.

Work on the construction of a four-in. pipe line from Las Palmas wells (Dabajuro field) to Hombre Pintato, Venezuela, has been commenced by the Creole Petroleum Corporation. From Hombre Pintato the crude will be pumped along the pipe line of the British Controlled Oil Fields Ltd., to the storage tanks at Las Estaceda, Lake Maracaibo, where it will be picked up by the Creole's tankers and shipped to the storage farm at Paraguana for export. This crude is of about 34 degrees A.P.I., and present production is approximately 3,000 bbl. a day from four producers out of eight wells drilled.

Steel storage tank capacity throughout Venezuela amounts to 18,842,980 bbl. gross capacity, and the bulk of these tanks have only been in service for three years. Throughout the lake and other fields there are hundreds of small flow, or pickup, tanks arranged in groups of three between two wells whence the oil is pumped to the shore storage tanks. For storage purposes the 80,000 bbl. tank predominates and altogether there are 131 of this size in Venezuela. The next popular size tank is the 55,000 bbl. unit, of which there are a total of 78. Altogether ten companies have storage tanks namely: Lago, Venezuelan Gulf, V. O. C., Caribbean, Colon, British Controlled, Tucuyo, New York & Bermudez, Creole and West India Oil companies.

The new Zulia state petroleum school will shortly open at Maracaibo, where there will be a 30 months' course of study and training for Venezuelans, based on actual field work on the drilling rig under normal operating conditions. Elementary geology will also be taught. Advanced students will be required to perform the work of drillers and tool pushers. During the course of instruction students will be paid at the rate of 400 bolivars per month by the State of Zulia. The school will be known as "Escuela de Perforadores Gen. Juan Vicente Gomez."

Additional information on Venezuelan operations was published in the February, June and October issues of WORLD PETROLEUM, and details of the development of Eastern Venezuelan oil fields are given on the following page.

Petroleum Situation in Eastern Venezuela

Developments to Date in This New Commercially Producing Field. Results of Seven Years of Active Exploration.

. . . ***(Translated from Spanish)***

CARACAS, VENEZUELA.

As has been indicated in previous issues of WORLD PETROLEUM, the petroleum zone located in the Eastern region of Venezuela has for some years been subjected to active exploration and drilling by several oil companies. Results which have been obtained to date, allow optimistic hopes for big future production. The zone extends itself along the coast of the Gulf of Paria from the Northern part of the Orinoco Delta to the Paria Promontory with an area that has been estimated about 2,100 square miles.

Comprised therein is the territory of the State of Monagas, the capital of which is Maturin, and which is bounded as follows: on the North, the State of Sucre; on the Northeast, the Gulf of Paria; on the East, the federal territory Delta-Amacuro; on the South, the State of Bolivar and part of the State of Anzoategui; and on the West, the said State of Anzoategui. It has an area of 28,900 square kilometers, with 55 kilometers of sea coast and 340 kilometers of river banks, because it is cut through by numerous rivers, or canos, as they are called locally.

The information contained in the first part of this article is confined to the exploitation of petroleum in the State of Monagas, for the reason that the first series of exports of petroleum drawn from the Quiriquire field, concessions of the Creole Petroleum Corporation, are being made at this moment. This company has been carrying on exploration and drilling in this district for seven consecutive years, and now it has seen its efforts crowned by promising production.

In the Quiriquire field there have been drilled 39 wells, each of which has been designated with the letter Q, together with its respective number. There are 18 wells under production and their daily yield runs from 200 bbl. per well up to 1,200 bbl. at depths from 2,000 to 3,100 ft. Of these 39 wells only one has been abandoned, and there are still eleven to be worked when the time is ripe.

The total potential production per day reached in the latter part of September last, was 12,000 to 14,000 bbl., which will be increased in the present month of October, according to the capacity of the pipeline, to 15,000 bbl. It will be recalled that on September 9th last, the first shipment of 70,661 bbl. of crude petroleum was made on the steamer GEORGE H. JONES, for the port of Montreal, Canada; on the 18th of the same month 71,925 bbl. were shipped, and on the 30th of September another shipment of 60,000 bbl. was made.

Tankers of large tonnage can enter the port of Caripito, situated on the river San Juan near the mouth of the tropical Caripe river, six kilometers from the town of Caripito. The San Juan river flows into the Gulf of Paria. At Caripito, ocean tankers are loaded with petroleum to a draught of 21 ft. because of the bar, and the ships then go out into the gulf and anchor, and accompanying shallow draft tank ships of smaller tonnage transfer their cargo, and complete the loading of the big vessels.

In order to carry out its petroleum exporting, the Creole has had to undertake various preparatory works; a 25 kilometer road (still under construction) between the Quiriquire field and the Caripito wharf, where there is 80 ft. of water; also an 8 in. oil pipeline, 29 kilometers in length, has been constructed to carry the crude from the Quiriquire fields to the Caripito storage tanks which are located at Sabana de Cachipo. There is another pipe line that runs from the tanks at Caripito to the Wharf; this pipe is of 12 in. diameter and our kilometers long. A railroad having a length of four kilometers runs from the Caripito camp to the wharf at the shipping place. At the sea terminal a wharf 100 meters long has been constructed. Tanks erected near Caripito are of two capacities, 10,000 bbl. and 8,000 bbl. A site is being prepared for a new tank with a capacity for 8,000 bbl. A private aeroplane service enables rapid communication of officials between this oil field and headquarters near Maracaibo.

The Quiriquire field is situated in the District of Piar, the capital of which is Aragua de Maturin, a distance of four kilometers from the town of Quiriquire. It possesses office buildings, warehouses for materials, machine shops, dwellings for employees, electric power plant, tanks. The company has 4,000 employees.

▼

Fight for Oil Tariff Continued

INDEPENDENT oil operators, particularly in the mid-continent fields, have by no means abandoned their endeavors for a tariff on imported oil. During the International Oil Exposition week, full page advertisements agitating for an import duty were run in the Tulsa newspapers, and a big parade protesting against proration and depression in the U. S. A. while foreign petroleum is admitted in competition with domestic crude was held. Parades and advertisements are to be arranged in other oil centers. Some of the banners and floats were not without real humour, including the automobile with the empty rear seat "reserved for executives of American companies importing oil." Others were unnecessarily personal, such as a Holstein bull on a truck labeled "Teagle's annual message to independent oil men." Another float carried a dog labeled "His Masters Voice—coming from 26 Broadway." The parade was received with a mixture of cheers and laughter by citizens and oil men visitors.

▼

International Drilling Congress

THE next International Drilling Congress will not be held next year as originally planned due to lack of funds. It cannot be held in 1932 because the International Geological Congress is to be held that year. It will be held in 1933.

How Mexico's Oil Controversy Was Settled

Delicate Situation Handled by Ambassador Morrow in Businesslike Manner. Rapid Progress Since Made with Confirmation of Petroleum Concessions. . . . By Douglas Grahame

"ON the eve of the Ambassador's departure from Mexico it is well to take stock and make a brief appraisal of his work here. On his arrival he instituted a new diplomacy. He lost no time in making it clear to those in authority that he had come to aid—to lend a helping hand to the Government to which he was accredited. He sat across the table, so to speak, and discussed with Government officials their problems in relation to his own. In the end he won the confidence and esteem of everyone with whom he came in contact. The results speak for themselves. Probably at no time within the memory of any man present here today have relations between the two Governments been more friendly, more cordial, than now.

"At first many of our countrymen did not recognize the wisdom of this new diplomacy. Many criticisms were heard but results have largely silenced the critics. The great majority of Americans in Mexico have recognized the truth and have been frank to admit it.

"There are some, however, mostly outside of Mexico, who for one reason or another still contend his policy was wrong; difficulties still exist and remain unsettled. Probably the one question most frequently cited by them is the oil controversy. In the matter of time, thought and study given to this subject for the last ten years, I yield to no man; and I wish to state to you here today that it is my firm conviction that this question, thanks to the Ambassador and his able Assistant, has been settled in the best manner possible. No other man could have done so well."

So said Judge W. E. McMahon, legal representative in Mexico of the Standard Oil Co. of New Jersey, at a luncheon given at the Mexico City American Club in honor of Ambassador Dwight W. Morrow and Mrs. Morrow on the eve of their departure to the United States.

At the time of Mr. Morrow's assumption of his diplomatic mission to Mexico, late in October, 1927, the petroleum situation had assumed the proportions of a crisis between the governments of Mexico and the United States. In substance, the controversy centered around the confirmation of rights acquired prior to the enactment of the Federal constitution of 1917. All sub-soil rights were nationalized, and the Mexican Government desired to confirm concessions for only 50 years. Oil interests wanted these concessions to be confirmed in perpetuity.

Pertinent provisions of the Constitution of 1917, in regard to petroleum and its exploitation, were:

"Art. 27 . . . Private property acquired for the said purposes shall be considered as taken for public welfare. In the Nation is vested legal ownership (*dominio directo*) of all minerals or substances which in veins, layers, masses, or beds constitute deposits whose nature is different from the components of the land such as minerals from which metals and metaloids used for industrial purposes are extracted; beds of precious stones, rock salt and salt lakes formed directly by marine waters, products derived from the decomposition of rocks, when their exploitation requires underground work; phosphates which may be used for fertilizers; solid mineral fuels; petroleum and all hydrocarbons—solid, liquid or gaseous. . .

"Only Mexicans by birth or naturalization and Mexican companies have the right to acquire ownership in lands, waters and their appurtenances or to obtain concessions to develop mines, waters or mineral fuels in the Republic of Mexico. The Nation may grant the same right to foreigners, provided they agree before the Department of Foreign Affairs to be considered Mexicans in respect to such property, and accordingly not to invoke the protection of their Governments in respect to the same, under the penalty, in case of breach, of forfeiture to the Nation of property so acquired. Within a zone of 100 kilometers from the frontiers, and of 50 kilometers from the sea coast, no foreigner shall under any conditions acquire legal ownership of lands and waters."

Certain parts of the Petroleum Law of December 26, 1925, also gave rise to much controversy. Pertinent points of this measure, were:

Art. 2: "The legal ownership (dominio directo) of the Nation . . . is inalienable and imprescriptible, and only with the express authorization of the Federal Executive, granted as provided in (en los terminos) this present law and its regulations, may the works required by the petroleum industry be carried out."

Art. 4: "Mexicans and civil and commercial companies (sociedades) constituted in conformity with Mexican laws, may obtain petroleum concessions upon compliance with the provisions of this law. Foreigners, in addition to the foregoing obligation, must comply beforehand with what is provided in Art. 27 of the present Political Constitution."

Art. 12: Concessions granted by the Executive of the Nation in accordance with previous laws shall be confirmed without expense whatsoever; with subjection to the provisions of this law.

Art. 14: "The following rights will be confirmed without any cost whatever and by means of concessions granted in conformity with this Law:

"1—Those arising from (que se deriven de) lands in which works of petroleum exploitation were begun prior to May 1, 1917.

"II—Those arising from (que se deriven de) contracts made before May 1, 1917 by the surface owner or his successors in title for express purpose of exploitation of petroleum. The confirmation of these rights may not be granted for more than 50 years computed in the case of Fraction I, from the time the exploitation works began, and in the case of Fraction II, from the date upon the which contracts were made.

"III—To owners of pipe lines and refiners who are at present operating by virtue of a concession or authorization issued by the Department of Industry, Commerce and Labor, and as to what has reference to said concessions or authorizations."

Art. 15: "Confirmations of the rights to which Arts 12 and 1 of this Law refer, shall be applied for within the period of one year; computed from the date of the

going into effect of this Law; that date having passed, said rights shall be considered as renounced and the rights whose confirmation has not been applied for shall have no effect whatever against the Federal Government."

Art. 17: The following are causes for the forfeiture of a petroleum concession:

I—Failure to perform regular work in the manner prescribed by this Law;

II—Violation of the provisions of Art. 5;

III—Failure to make the deposit of guaranty as prescribed in Sections II and VI of Art. 7; and,

IV—Failure to pay the taxes due the Federation. Some provisions of The Constitution of 1917 and The Petroleum Law of 1925 created a number of interesting legal actions by petroleum companies operating in Mexico. Among these was the suit for an "amparo" (literally "protection," or "shelter," and what corresponds in the United States to an injunction) brought by the Mexican Petroleum Co. of California against the Ministry of Industry, Commerce and Labor. The action alleged violation of Articles 4, 14, 16, 22 and 27 of the Federal Constitution, in that the Ministry had revoked drilling permits for three wells on the ground that petition for confirmation of its rights had not been made under the terms of the Law Regulating Article 27 of the Constitution as to Petroleum, under date of December 26, 1925.

The Supreme Court of the Nation handed down a decision on November 17, 1927, confirming the decision of the lower court which granted an "amparo" to the Company.

The Huasteca Petroleum Co. applied for, and was granted, an "amparo" against application to it of Articles 2 and 15, in relation to Articles 4 and 14, of the Petroleum Law of 1925.

Such was the petroleum situation when Mr. Morrow took over the post of American Ambassador to Mexico. He got to work as soon as he had presented his credentials. The new diplomat dealt in direct action. He did not follow any custom of applying to the Ministry of Foreign Relations for interviews with government officials, but went directly to these Cabinet ministers, put his legs under the same table with them, and got down to business. Almost immediately after Mr. Morrow's arrival here, his efforts and those of his legal adviser J. Reuben Clark, Jr., (the newly appointed United States Ambassador to Mexico) had results.

Under date of January 3, 1928 (a little more than two months after Mr. Morrow's assumption of office) the Chief Executive promulgated the following important amendments to the Petroleum Law of 1925:

"Art. 14: The following rights shall be confirmed without cost and by means of the issuance of confirmatory concessions:

"I.—Those attaching to lands on which works of petroleum exploitation shall have been begun prior to May 1, 1917.

"II.—Those originating in contracts executed prior to May 1, 1917, by the surface owner or by his successors in interest, for express purpose of petroleum exploitation.

The confirmations of these rights shall be granted without limitation of time whenever they should run in favor of the surface owner; and for the term stipulated in the contracts in the case of rights originating in contracts executed by the surface owners or their successors in interest.

III.—Those corresponding to pipeline and refinery operators who may be working at the present time under concessions or authorizations issued by the Department of Industry, Commerce and Labor, and insofar as refers to the said concessions or authorizations.

Art. 15.—A period of one year, reckoned from the day following the publication of these amendments to the same day, inclusive, of the following year, is hereby granted, within which the interested parties may apply for the confirmation of the rights to which the foregoing article refers, and which had not been the object of confirmatory applications within the period allowed by this law in its original terms.

On the expiration of this term, these rights shall be held to have been waived and the rights whose confirmation shall not have been applied for shall have no effect whatever against the Federal Government.

On behalf of the Huasteca Petroleum Co., of which he is legal representative, Hiliarion N. Branch, wrote to the Ministry of Industry, Commerce and Labor asking if, in regard to amended Article 14 of the Law of 1925, an application for a confirmatory concession by a foreign company involved surrender of any rights held prior to May 1, 1917.

The Ministry replied, in part:

". . . This Department believes that the petition for confirmatory concession on the part of a national or foreign company does not imply the renunciation of rights acquired before May 1 of 1917, such confirmatory concession operating as the recognition of rights which will continue in force subject only to police regulations."

Thus, a very difficult situation was straightened out. Mr. Morrow's direct action diplomatic methods brought about a prompt solution of a problem that had occupied a great deal of time. Within a few days, and with but a few words, he arranged a matter that had occasioned the use of upward of 40,000 words in diplomatic and other correspondence.

▼

Mexican Wildcatting

VARIOUS petroleum companies, chief among which is the Federal government Administrative Control of National Petroleum, have started the sinking of wells to great depths in an effort to tap new oil deposits. These experiments have aroused a great deal of interest, for it is anticipated that they will result in the opening up of many new petroleum fields.

One of these deep test wells has been sunk by the Administrative Control on property it owns near Ochoa, state of Tamaulipas. The well was sunk 3,600 ft., but gas and oil obtained was not considered of especial commercial value. Drilling is being continued, however, to a depth of 6,000 ft., and gratifying results are anticipated. Deep wells are being sunk south of the Ochoa zone by the Mexican Sinclair Corporation and the Mercedes Petroleum Co.

▼

Colombia's New Oil Laws

SEVEN representatives of American oil companies were called to the palace at Bogota, Colombia, by President Olaya Herrera on October 10th, to discuss the terms of the new petroleum production bill, which has been prepared for submission to the Colombian Congress. The Texas Company, Tropical Oil Co., Standard Oil Co. of Cal.; Gulf Oil Corp., Sinclair Consolidated Oil Corp., and the Standard Oil Co. of N. J. were represented. Apparently the bill as proposed will need a number of modifications if it is to cause active oil development in Colombia. The federal royalty of 12 per cent and the requirements that drilling must start immediately that land is leased, appear to be among the stumbling blocks to outside approval of the bill. George Rublee, the attorney who assisted Ambassador Morrow to untangle the complexities of the Mexican oil problem, has been retained by the Colombian Government to aid in drafting the new petroleum laws. Mr. Rublee will be in Bogota by the time these notes appear in print.

Has Germany Extensive Oil Deposits?

Over Three Thousand Wells Drilled or Mined with Antique Methods Produce Less than a Million Barrels Annually. Modern Drilling Just Commenced . . . By Dr. Richard Lewinsohn

Financial Editor
Vossische Zeitung

OILFIELDS in the federal states of Braunschweig and Oldenburg, Germany, may soon be exploited on an important scale by the German Sinclair Petroleum Corporation, subsidiary of the American Sinclair concern, and by the North European Oil Corporation, and are to be followed by internal refinery and marketing expansions. Antiquated drilling methods have prevailed in Germany, and of over 3,000 wells in Hanover alone only 760 are in production, with 100 bbls. per day as the record flow per hole until last month. Deeper drilling and the most modern geological methods offer a gamble rich in commercial rewards if successful, and heavy losses if present production is not bettered. In recent weeks a well at 3,300 ft. produced 7,500 bbls. of crude.

WITHIN recent years, the question of oil production has received interesting attention in Germany. After the war, this interest became almost extinguished because Germany lost not only the Pechelbromm oil fields in Alsace, but also its most important foreign oil properties, especially those in Roumania. At the present time, oil has become an economic question of the greatest importance to German consumers. The expanding use of the automobile in Germany has created a demand for 17,500,000 bbl. of petroleum a year. At the present time the imports of oil products amount to $60,000,000 annually. This explains the strenuous efforts of German industry to produce motor fuel by chemical means. The processes worked out by the I. G. Farbenindustrie for the hydrogenation of coal and the manufacture of benzol, with which the heavy chemical industry is especially busy, have led to great progress in recent years.

In 1929 there were produced in Germany, 700,000 bbl. of synthetic benzine and 2,625,000 bbl. of benzol. In the first six months of 1930 the production of synthetic benzine was about 350,000 bbl., but due to the general condition of business stagnation, the production of benzol was much decreased. But no matter how optimistically the future development of chemically produced motor fuel may be regarded, the time when Germany will cease to be dependent on petroleum products is not yet in sight.

Petroleum production in Germany covers only about five per cent of German requirements. The most important oil deposits lie in northwestern Germany in the province of Hanover. During the past year, about 700,000 bbl. of petroleum were produced here. Of this production, 280,000 or 350,000 bbl. are credited to the Deutsches Erdoel-Gesellschaft, half of which was obtained by means of mine shafts that were sunk during the most acute period of oil shortage of war time. A further 280,000 bbl. was produced by the Gewerkschaft Elverath and the rest by small enterprises. How troublesome and risky is the business of petroleum production in northwestern Germany may be gathered by comparing the production figures with the number of wells sunk. In Hanover too, there is an impressive forest of oil derricks. In the course of half a decade, more than 3,000 holes have been put down and at the present time not less than 760 wells are in production. But the oil trickles slowly; production on an American scale is far from being realized, and when an occasional gusher pops forth, it proves very easy to control; a hundred bbl. per day is the maximum recorded performance.

The proposition of dry holes is also different from what is usual in the rich fields of America or in the Caspian region. One good hole to a dozen poor ones is the rule; but it must not be overlooked that up to now the most antiquated methods of geological work and drilling have prevailed. The petroleum is usually found around the edges of salt deposits. In all, about 50 salt deposits are known, but up to the present time, only four have been thoroughly tested to the point of commercial production of crude. The oil horizon under exploitation lies mostly at 1,250 to 1,550 ft. In recent years, some wells have gone deeper and at 2,450 to 3,300 ft. better results have been obtained. Introduction of the most modern methods and deeper drilling may change the results.

The legal situation is also a source of difficulty. Germany does not have a simple oil law. In some "Lands" (Federal States) the State has the exclusive right to produce oil or to dispose of the product. In the Prussian Province of Hanover, where the richest oil deposits lie, the petroleum is the unrestricted prosperity of the land owner. The proprietors are usually well-to-do farmers who for a long time have been united in an association (Verband) and exact a sizable price for the right to prospect on their holdings. The hope of making richer strikes of oil in Hanover has from time to time given rise to waves of speculation in oil options.

Against these disadvantages in northwestern Germany there stand certain advantages. The Hanoverian oil fields are provided with excellent means of transportation. The oil fields are about 100 kilometers from the Coast with a network of railroads and canals to Hamburg and Berlin. The costly construction of railroads and pipe-lines, which makes the opening of virgin oil fields so

Nienhagen, one of the largest oil fields in Germany.

difficult in many countries, is unnecessary in connection with the Hanoverian fields. In addition, the oil producer who produces to the limit of his capacity, does not need to worry about the disposal of his product. The great oil requirements of Germany assure him a market. And the government would be willing to give him any necessary protection in proportion as he becomes able to decrease the necessity for importations, the tariff on crude being 120 marks per bbl.

To definitely ascertain the yielding ability of the Northwest German oil fields, a large scale research will be necessary, which will require large capital to put through. But there is a shortage of capital in Germany. Therefore, the news given out in the spring of 1930 that an American group was to sink oil wells in Hanover province and the neighboring regions was favorably received. Unfortunately the first announcement, which it appears was given out in a bungling market-stirring fashion without the knowledge of the American interests, aroused mistrust. It was at first regarded as only another speculative maneuver. But it now appears that the Americans are really going to try their luck in an earnest and up-to-date move in Northwest Germany. The North European Oil Corporation—an American company—has assured itself of extensive leases and up to now has spent between $1,000,000 and $1,500,000 in preparatory work. An additional investment of two million dollars annually is being contemplated. T. M. Pettigrew, connected with the company, has been in Germany for some months in order to direct the work on the ground. The first drillings have not resulted in any noteworthy finds of oil; it is hoped, however, to obtain better results by going to about 6,000 ft., deeper than heretofore realized in Hanover. The whole matter, however, is still in the first stages. The future will show whether it is the beginning of a more important era of oil production in Germany.

▼

Deep Well Results in Germany

A GUSHER at 3300 feet in the Nienhagen field capable of 7000 bbl. per day, but pinched in to about 3000 bbl., is reported to have been brought in on October 1st by the Elwerath Co. The North European Oil Co. is coring a well at 4400 ft., and has a string of deep-drilling tools being operated for it by the Preussische Bergwerks und Huetten AG. The Anton Raky Company is reported to have brought in a well of 1000 bbl. daily capacity in the Oelheim district.

North European Oil Company's well in Oldenburg, showing modern American drilling outfit.

Some notes on drilling a deep well in Germany with an American crew under the supervision of L. Hansen have been sent us by John Hamilton of the International Derrick and Equipment Company. Mr. Hamilton states though backed by the best geological knowledge it is in all respects a wildcat well and differs in all other respects from all other wells in Germany in as much as it has been drilled according to the latest ideas in American practice and experience. A depth of 1945 ft. has already been reached in a greenish-gray shale of the lower Eocene. The well is located three miles west of the village of Brake, on the river Weser. The derrick, drill pipe, rock, and fishtail are of American manufacture, but the draw works, rotary equipment and casing were supplied by German manufacturers.

▼

Sinclair Activities in Europe

By Harry F. Sinclair

MOST of my time in Europe was spent in a detailed examination of our own activities and of general conditions in Germany, Belgium, Holland and France. I am rather surprised to be informed that dispatches have been printed in the United States representing me as having determined upon a policy of general investments and expansions in Germany. I was impressed with the prospects of a substantial production in the Hanover district but the whole matter, so far as our company is concerned, is in a stage of investigation. What our next steps will be depend upon the outcome of examinations of properties and the conclusions of our experts as to the future possibilities of oil production in Germany, also as to what could profitably be done with this oil, if it is found.

Lowering Tubing in Gas Lift Well

How a New and Efficient Method Enables the Work to be Done Without Interruption of Production or Circulation

. . .

By H. A. Brett

Production Engineer, Union Oil Company of California.

EFFICIENT production from a well by means of gas lift depends upon a nice balance between several variable factors. Some of these factors are easily controlled from the surface, while others which have to do with the mechanical condition of the hole may be varied, by the usual methods, if at all, only at the expense of considerable time and money. The general relations between the several factors affecting gas lift production may be determined in most cases with a fair degree of accuracy by formulae and experience, but optimum operating conditions are determined only by trial and observation.

One of the most important of these factors, and one of the most difficult to change once the well is on production, is the depth of the tubing. A well is brought in with the tubing set at a point determined by the management and based on past experience, which may or may not be the correct depth for the well in question during its entire life. If the well flows naturally, the only method of changing the tubing depth heretofore available was to kill the well. This operation is expensive due to labor and loss of production and hazardous in that the well may blow in out of control.

Assuming that a naturally flowing well has reached a point where gas lift methods are necessary to maintain production, it is more than probable that the tubing depth must be changed if the maximum production is to be obtained. By ordinary methods, this will involve killing the well, changing the tubing depth, kicking the well over each time a change is made (a more or less difficult operation), loss of gas, and loss of production as the result of down time. In the case of wells where tubing depths of 5,000 feet or over are indicated, the starting or kick-over pressures are so great as to be prohibitive from the standpoint of practical operation.

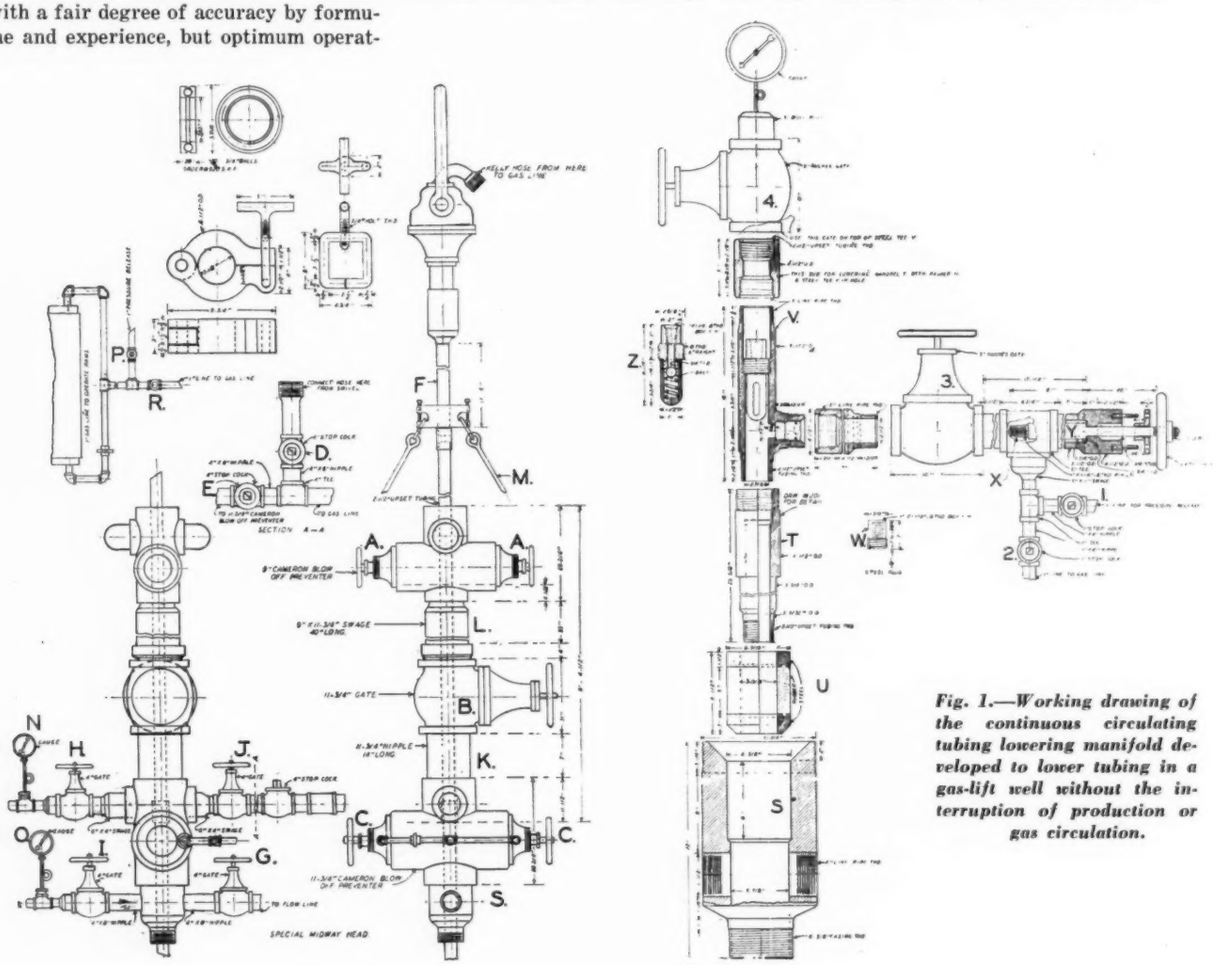


Fig. 1.—Working drawing of the continuous circulating tubing lowering manifold developed to lower tubing in a gas-lift well without the interruption of production or gas circulation.

In order to overcome the difficulties now encountered in changing tubing depth of gas-lift wells, and to provide a means whereby excessive pressures can be eliminated in conjunction with the operation of very deep gas lift wells, the Union Oil Company of California has perfected—and applied for a patent—whereby the tubing of a flowing or gas lift well may be safely and quickly raised or lowered without interrupting the production or the flow of circulating gas and whereby the tubing in gas lift wells may be lowered to great depths without the use of excessive pressures. The use of continuous circulation insures an aerated column of fluid during the entire operation.

The apparatus with which these results are accomplished was invented by A. C. Rubel, assistant manager of field operations, F. W. Lake, superintendent of production, southern division, and Henry Grinnell, assistant-supervisor of shops and tools, southern division.

The device consists of two separate units, Unit A which is attached to the casing head, and Unit B which is used to handle the tubing. Unit A consists of a special midway head provided with two flow line connections, screwed on the top collar of the oil string. On top of the midway head is screwed a Cameron blowout preventer, which is provided with special rams to fit the particular tubing being handled. There also is fitted on the head a two-way valve connection known as the circulating manifold for the introduction and control of circulating gas. A second blowout preventer is located above the first. The supporting string is made up of a nipple, a gate valve, and another nipple, the whole having a total length of approximately six feet. A platform of suitable height is built to accommodate the workmen who operate the upper blowout preventer and handle the tubing.

Unit B consists of a landing mandrel and lowering manifold made up as follows: The landing mandrel is provided with a male thread on its lower end to engage the tubing being handled, and also shouldered to fit a special rubber packer which fits in the previously mentioned midway head. The upper end of this mandrel is threaded to engage a special tee, which is machined and threaded inside to receive a check valve in the straightaway and a plug in the side outlet. Located above the special tee is a length of line pipe which carries a snubbing collar, the purpose of this and of the tee will be described later. The upper end of the pipe is attached to a rotary swivel, which carries a high pressure rotary hose leading back to the circulating manifold.

Figure 2 shows this apparatus set up and in use. A new joint of tubing has just been put in and the tubing mandrel is about to be broken off.

To lower the tubing in a well that is not equipped with the special midway head S, landing mandrel T, and special tee V (see Figure 1), the well must first be killed and these fixtures installed. Lowering the tubing without interruption of circulation or production is then accomplished in the following manner. The well is kicked over by gas entering the tubing through the gate 3. Gate 4 is closed, its bull plug and gauge being

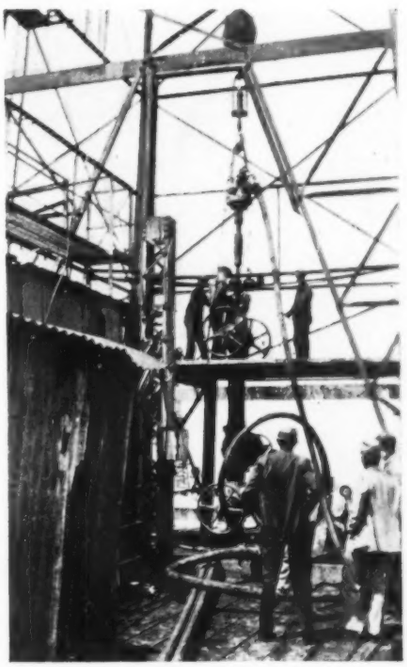


Fig. 2.—Apparatus in operation. The mandrel is about to be broken off following insertion of a joint of tubing.

replaced by the stuffing-box Y. The check valve Z is screwed on the end of the wrench X. Pressures on the tubing and on stuffing box Y are equalized by means of the stop cock 2, connected with the circulating gas line. When the pressures are equalized, the gate valve 4 is opened, the check valve Z is screwed into the special tee V, wrench X is backed off and pulled into stuffing-box Y, stop cock 2 is closed, and stop cock 1 opened, which relieves the pressure in Y. Gate 4 may now be removed. Gas pressure in the tubing is maintained by the check valve Z, which has just been installed as described above. The blowout preventer assembly is then picked up, and mandrel F is stripped through and screwed on top of special tee V. Stop cock D is opened and circulating gas is introduced into the tubing from above through the rotary hose and swivel. Gate 3 and stop cock E are closed and the gas connection broken.

At this point in the operation, the blowout preventer assembly is hanging free over the mandrel F and at such a height that the side opening of special tee V is exposed below the rams C. With the blowout preventer assembly in this position and the circulating gas entering the tubing from above, stuffing-box Y (with wrench X attached) is screwed into the gate 3, and the plug W is installed by means of the wrench X as described above for the installation of the check valve Z. When the plug W has been installed, thus closing off the side outlet, pressure in the stuffing-box Y is relieved, and gate 3 and the stuffing box are taken off. The blowout preventer assembly is then lowered over the tee V, screwed on the midway head S, and connected up to the stop cock E, equalizing lines P and R.

The next step is to remove the packer U and the landing mandrel T in the following manner. Rams A are closed, while the gate B and rams C are open and the stop cock E closed. Gates I and H are opened. Stop cock E is now opened until pressures on N and Q are the same. This operation equalizes the pressures on the casing and in the chamber which is closed at the top of rams A. The tubing is then raised by the swivel against the friction of the closed rams A until the collar which engages the mandrel T that is resting on the packer U, is above rams C. Pressure on rams C is equalized by closing the stop cock P and opening the stop cock R. Rams C are then closed and the tubing lowered until the top collar rests on rams C.

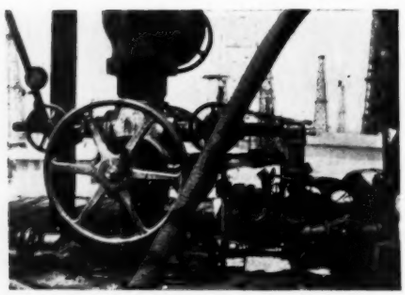
Mandrel T is then unscrewed from the tubing and pulled above the gate B. Stop cock E is closed, stop cock D opened, and gate B closed. Circulation now passes through gate J and into the chamber closed at the top by gate B and down the tubing. Rams A may now be opened and the landing mandrel T with the packer U attached is pulled out of the hole, broken away from tubing mandrel F, and laid down. The upper chamber is now open. A joint of tubing is then picked up and screwed on the tee V with the snubbing device attached to the tubing. The tubing is lowered into chamber L and rams A closed around it. Gate B is opened and the tubing snubbed through the closed rams

into the lower chamber K. Stop cock D is opened and stop cock E is closed, which causes the circulating gas to pass through the swivel and down the tubing, just inserted, which is stabbed in the collar resting on rams C and made up as tightly as possible. Rams A are opened and the tubing raised until the collar which was resting on rams C is above rams A. The joint is now completely made up and the tubing lowered until the same collar as before rests on rams C.

Rams A are then closed, pressures are equalized on N and Q and released back of rams C which are opened. The tubing then is lowered until the top collar of the new joint rests on rams A. Rams C are closed, rams A are opened, and the tubing lowered until the top collar rests on rams C, and then rams A are closed. Mandrel F is now backed off and pulled up into chamber L. Circulation is switched from the swivel to the lower chamber by closing the stop cock D and opening the stock cock E. Gate B is closed, and the mandrel is pulled out of the hole ready to be attached to the next run of tubing.

The above operations are repeated each time additional tubing is put in. Tests made as devised indicate when sufficient tubing has been put in. These are made while the tubing is being lowered, by the simple process of interrupting lowering operations a sufficient length of time to gage the production and measure the gas. The tubing then is permanently landed in the following manner. Landing mandrel T with the special tee V, equipped with plug W and check valve Z as already described, is picked up. The rubber packer U is slipped on the mandrel T. This assembly, which is screwed on mandrel F, is lowered into the well. When mandrel T and the tee V have passed rams A, the latter are closed around the mandrel F and the gate B is opened. The assembly is snubbed through the closed

Fig. 3.—Lower rams, gas and oil connections.



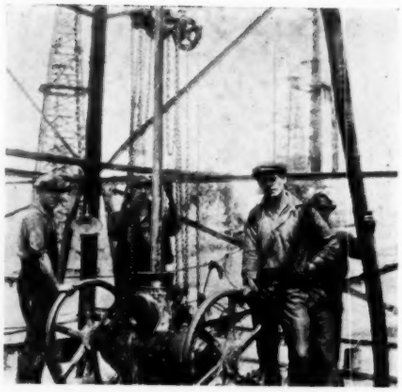


Fig. 4.—Upper rams with snubbing device in operation.

rams A and stabbed in the collar of the tubing that is resting on rams C. Circulation is switched to the swivel by closing the stop cock E and opening the stop cock D. The whole string of tubing is raised above rams A as described above and the joint is made up. The tubing is then lowered through rams C as just described until the rubber packer just placed on the mandrel T is landed on midway head S.

The blowout preventer assembly is now unscrewed from the top of midway head S, and raised until the special tee V is exposed. Circulating gas then enters the tubing through the swivel, with the tubing and casing packed off by the rubber packer in the midway head S. To complete the removal of the blowout preventer assembly, gate 3 with the stuffing box Y attached is screwed on to the side outlet of the tee V. Pressures on the stuffing-box Y and tubing are equalized, gate 3 is opened, and plug W is screwed out by the use of the wrench X, and pulled into the stuffing-box Y. Gate 3 is closed.

Pressure on the stuffing-box Y is relieved and stuffing-box Y removed. The gas line is connected to gate 3 and circulation permanently established through this connection. Stop cock D is closed and the gas connection opened. Mandrel F is unscrewed from the tee V and is laid down. The blowout preventer assembly, which is now hanging free over the tee V, is stripped off and laid down. Gate 4 is then attached to the top of the tee V and the check valve Z is removed by the use of stuffing-box Y as described for the removal of plug W. Gate 4 is closed and fitted with a bull plug and gate. Gate 4 may now be opened.

While the above described operations may appear tedious and involved, in actual practice little difficulty is experienced. A condensed and non-technical statement of the process of lowering tubing may be described as follows. Assume that the tubing is landed on rams C with gate B closed, but with rams A open, and that gas is introduced through J and thence down the tubing. The new joint, to which is attached a swivel and hose, the mandrel F, and the tee V (which in turn is equipped with check valve Z and plug W) is lowered through rams A to gate B. Rams A are closed, gate B opened, and the tubing snubbed through rams A and stabbed in the lower collar that is landed on rams C. Gas circulation is transferred from J. to swivel, rams C opened, and the tubing lowered until the new collar is landed on rams C. Rams C are then closed and the tee V unscrewed from the tubing and raised above the gate B. Gate B is closed, cirulation introduced through J, rams A are opened, and the assembly is pulled out. This process is repeated until the desired amount of tubing has been put in.

After the first one or two runs, the several operations become mechanical on the part of the men, and the whole is accomplished smoothly and in a surprisingly short time. Using this apparatus and a crew of seven men, the Union Oil Company of California lowered two and one-half inch upset tubing in its Long Beach Community Well 16 without incident from 4,853 feet to 6,392 feet, a total of 1,539 feet, in 24 working hours or an average rate of 45 minutes per double.

▼

Diesel Truck and Power Plant

ON sea the Diesel engine has made a big change in the refining and marketing arrangements of oil companies, due to the particular grades of fuel desired by shipowners. In the very near future an important change on land will have to be met by the oil industry as large numbers of trucks, busses, shovels, portable compressors, pumps, etc., will burn fuel-oil instead of gasoline due to the steady development of the high-speed Diesel engine. A noteworthy performance has just been made by a Reo speedwagon driven by a Hill 2,000 r.p.m. Diesel engine, and having on the body as freight a similar Diesel engine of 40 hp. together with generator. The run was over a distance of 1,478 miles, using fuels purchased en route, including five-cent fuel oil and kerosene that had been used to wash out an engine crankcase in a garage. A total of 74 gallons was burned, at a cost of $5.02, or $0.00339 per ton mile pay load.

Story of Petroleum Hydrogenation, II

Continuation of the Description of this New and Important Oil Refining Process from Page 435 of the October Issue of World Petroleum.

. . . *By R. T. Haslam and R. P. Russell*

Vice-President and General Manager Standard Oil Development Co.

General Manager Hydro Engineering & Chemical Co.

CRUDE residues from Smackover, Venezuela, Colombia and similar crudes give lower knock rating gasolines than residues from Mid-Continent crude. The gas-oil formed in the liquid phase operation, in addition to having a relatively low sulfur content, cracks to give a gasoline which finishes to specification easily, even though the gas-oil was produced by hydrogenating a high-sulfur, high-asphalt crude or residue. The workability of this phase of the process has been demonstrated on fuel oil residues from reduced Crane Upton, Panuco, Venezuela, Panhandle, Mid-Continent, Talang Akar, Long Beach, Alamatos, Smackover, Reagan and other crudes.

In general, it is felt that the early application of this phase of the hydrogenation process will be to run these heavy asphaltic products in the liquid phase to produce small yields of gasoline and the balance gas-oil, with a total volumetric yield of 101 per cent to 104 per cent; the gas-oil to be cracked to produce gasoline in existing cracking equipment or converted into good knock-rating naphtha by hydrogenation as described under Table V of this article. If the gas-oil is cracked in present apparatus, as much of the cracking plant tar as is needed for the production of steam and power in the refinery may be used as fuel and the balance returned to the hydrogenation unit. In this way the greatest use of present refinery facilities and gasoline yield can be obtained with a minimum hydrogen consumption. Depending upon the stock and operating conditions, a yield of 80 per cent to 90 per cent of gasoline may be obtained by this method. If none of the cracking coil tar were burned as fuel, the combined yield of gasoline would be approximately 100 per cent.

Some typical examples of the liquid phase operation are given in Table II in which a comparison is shown of the inspections of three heavy feed stocks before and after hydrogenation. All the asphalt present in the charge was converted into more paraffinic type products, about two-thirds of the sulfur eliminated and the entire product was a yellow distillate oil. As another example, it was found in hydrogenating at 7.2 A. P. I. gravity cracking coil tar, that the sulfur was reduced from 2.77 per cent in the charge stock to 0.49 per cent, in the total overhead, and this product contained 22.1 per cent of gasoline of 0.071 per cent sulfur without further treatment.

II. Improvement of Low-Quality Lubricating Distillates

With the improvement in the internal-combustion engine, and particularly with the rapid expansion in air transportation, there has developed an insistent

Table II.—Results of Hydrogenating Heavy Feed Stocks

	Topped Crane Upton Crude			Topped Nacona Crude		Cracking Coil Tar	
	Feed	Product Ex. 1	Product Ex. 2				
Product—% by Vol.	...	107.7*	100.5*	...	101.5*	...	98.9*
A. P. I. Gravity	23.4	35.8	35.1	24.9	37.5	12.4	23.5
I. B. P.	350	138	...	344	130	340	153
% @ 212	...	4.0	...	...	4.0	...	3.0
% @ 284	...	8.5	...	...	10.0	...	6.5
% @ 374	...	18.0	24.5	...	21.0	...	12.5
% @ 400	...	22.0	30.0	1.0	25.0	0.5	14.0
% @ 460	6.5	33.5	41.0	1.5	36.5	...	20.5
% @ 650	40.5	77.5	79.0	34.0	76.0	34.5	67.0
% @ 700	66.0	87.5	86.5	82.0	85.5	49.0	82.0
% Sulfur	1.25	0.198	0.530	0.760	0.108	0.702	0.246
% Gasoline*	...	22.0	30.0	...	25.0	...	14.0
* A. P. I. Gasoline	...	57.3	57.6	...	60.8	...	56.4
% Sulfur in Gasoline	...	0.034	0.056	...	0.049	...	0.019

* Does not include a small yield of absorption naphtha produced concurrently.

▼

Table III.—Results of Hydrogenating Various Burning Oil Distillates

Feed Stock	Low grade Mid-continent	Low grade Mid-continent	Alemitos (Cal.)	Long Beach (Cal.)	West Texas Light Gas Oil	Cracking Coil Distillate	Colombia	Cracked Mid-continent	West Texas Diesel Fuel
Gravity; °A.P.I.	40.2	41.1	36.4	36.8	35.3	39.0	36.1	39.7	30.5
Viscosity*	485	480	750	750	705	335	600	400	595
Sulfur, %	0.221	0.285	0.550	0.240	0.761	0.157	0.202	0.334	0.187
% "400" Vis. Oil** in original	58	90	38	40	30	100	30	100	40
A.P.I. of "400" Vis. Oil	41.2	40.0	40.0	39.9	39.1	39.0	38.9	39.7	35.1
Vis.* of "400" Vis. Oil	400	450	380	400	410	335	400	400	400
RESULTS OF HYDROGENATION									
Volumetric Recovery***	106	100	106	99	102	100	101	103	105
A.P.I. of Total Product	48.9	52.1	46.0	45.6	54.2	45.8	51.6	47.2	51.9
% Sulfur of Total Product	0.006	0.011	0.022	0.025	0.026	0.024	0.029	0.014	0.019
% "400" Vis. Oil in Total Product	83	75	65	60	58	85	73	80	65
A.P.I. of "400" Vis. fraction	46.0	46.7	43.0	43.3	45.5	43.8	44.1	44.4	44.0
Vis.* of "400" Vis. fraction	415	380	410	400	375	335	355	360	360
Sulfur %	0.007	0.012	0.013	0.012	0.018	0.022	0.013	0.025	0.015
Flash °F. (Abel)	107	100	122	120	109	128	104	106	115
Color (Saybolt)	22	25	17	25	25	25	18	25	—
% Sulfur elimination	97	96	96	90	97	85	86	96	96
Improvement in A.P.I. of "400" Vis. fraction	4.8	6.7	3.0	3.4	6.4	4.8	5.2	4.7	8.9

* Saybolt Thermo. Refined Oil viscosity @ 90° F.

** The term "400" Vis. oil is used to denote the fraction of about 400 vis. and above 100° F. Abel flash. As will be noted the true viscosity of most of the cuts actually made was slightly above or slightly below 400.

*** Not including a small yield of recovery naphtha produced concurrently.

demand for better motor lubricants. The modern motor lubricating oil, to give good service, should have (1) a flat temperature viscosity relationship, (2) a high flash point, (3) a low Conradson carbon content (to give minimum carbon deposition in the motor), and (4) should flow sufficiently freely at low temperatures to permit adequate lubrication under extreme conditions. With present refining methods it has not been possible to meet all of these requirements in a single oil, even from the best crude oils available.

A considerable amount of work has been done to determine whether by the use of the hydrogenation process, all of the above characteristics could be combined in a single oil. In general, hydrogenated paraffinic lubricating oils with a flat temperature-viscosity relationship are characterized by unusually high flash points and low Conradson carbon content. The high quality of these hydrogenated lubricating oils predicable from the laboratory inspection has been substantiated in actual engine tests. In view of the possibility of producing essentially the same premium quality lubricating oils from a wide variety of inferior lubricating distillates, it would seem that hydrogenation will have an important influence in this field of refining in the future.

It has been found that by hydrogenation it is possible to make marked improvements in a number of inferior quality lubricating distillates. Under the best conditions for this type of hydrogenation there is produced from 100 barrels of lubricating distillate 103 to 104 barrels of hydrogenated product containing from 60 to 85 barrels of lube oil, somewhat lower in viscosity but much more paraffinic than the charge, together with about 10 barrels of gasoline and from 10 to 30 barrels of gas oil. About 80-90% of the sulfur in the feed stock is eliminated during hydrogenation.

Tables 1, 2, 3, 4 and 5 give yield charts showing the products obtained using various charging stocks.

III. Production of High-Grade Kerosenes

High-sulfur, low-gravity, off-color kerosene distillates and poor quality light gas oils may be hydrogenated to produce high yields of water-white distillates and burning oils of high quality. In general these products meet specifications as to sulfur, color, and smoke tendency with no other treatment than reduction to flash and viscosity.

Table IV. — Finishing of Cracked Smackover Naphtha by Hydrogenation

Total Product	Charge Cracked Smackover Naphtha	Hydrogenated Products (100% Yield)
Gravity (A.P.I.)	46.4°	51.9°
Sulfur	0.395%	0.019%
Doctor	Does not pass	Passes
Color	Straw	†25 Saybolt
I. B. P.	124° F.	134° F.*
% @ 212° F.	14.5	12.0
% @ 302° F.	40.5	45.0
% @ 374° F.	64.0	73.5
% @ 400° F.	71.5	82.0
F. B. P.	510° F.	502° F.
Gasoline		
Gravity (A. P. I.)	53.9	55.3
Sulfur	0.188%	0.006%
Porcelain Dish Gum	12 mgs.	1 mgs.
Copper Dish Gum	21 "	4 "

† The change in initial boiling point is due to not fully recovering the low boiling fractions from the recycle gases.

Table V.—Finishing of Cracked Mid-Continent Naphtha by Hydrogenation

	Feed Cracked Naphtha	Acid Treated No. 7 98 Acid/bbl.	Hydrogenation No. 1	Hydrogenation No. 2
% 400 F.B.P. Gasoline based on feed.	71.5	64.2	65.4	65.7
Gravity (A.P.I.)	53.9	53.1	56.1	44.3
Sulfur %	0.39	0.15	0.15	0.02
Porcelain Dish Gum (mgs.)	12	8	3	3
Accelerated Gum (mgs.)	51	37	3	4
Anti-knock Value as % Iso-octane in n-heptane	65.3%	62.2%	63.8%	78.0%

Table VI.—Production of Anti-Knock Gasolines by Hydrogenation

Feed Stock	Mid-Continent Light Gas Oil	West Texas Cycle Gas Oil	
A. P. I.	37.4	30.3	
Initial	474	400	
% @ 460	2.5	56.0	
% @ 550	89.0	—	
% @ 650	—	—	
% @ 700 or F. B. P.	618	612	
Sulfur	0.153	0.192	
Aniline Point	161	102	
Hydrogenated Product			
Yield-% by vol.	89.9	94.5	88.0
A. P. I.	55.4	39.8	42.3
Initial	95	110	109
% @ 212	35.0	13.5	12.0
% @ 284	54.0	25.0	32.5
% @ 356	72.5	—	—
% @ 374	79.0	56.7	70.5
% @ 400	87.0	70.5	90% @ 392
F. B. P.	428	436	412
Knock Rating as % iso-octane in n-heptane	72.6	82.2	85.0
Disolved Gum	17.7	9.0	—
Sulfur	0.013	0.005	0.006

Table VII.—Influence of Character of Feed Stock on Knocking Tendency of Hydrogenated Gasolines

Gasoline Yield	89.9	91.4	88.0	89.0
Aniline Point of Charge Stock	161	139	102	79
General Characteristics of Charge	Highly Paraffinic	Medium Paraffinic	Medium Aromatic	Highly Aromatic
Knock Rating as % iso-octane in n-heptane	72.6	75.3	85.0	86.2

In this adaptation of hydrogenation it has been found desirable to start with a stock somewhat more viscous than the desired finished oil, with the result that in many cases the actual yield of finished high grade burning oil has been greater than the amount of low-grade material of kerosene boiling range and viscosity

originally present in the charging stock. Liquid yields are from 100% to 105% by volume and the product from 65% to 85% of high grade burning oil, the remainder being a gasoline. This is shown for a typical case in Fig. 6.

A survey of a number of feed stocks has shown that burning oils at least equal to those obtained from straight run Mid-Continent or Pennsylvania distillates can be obtained from such stocks as California, Coastal, heavy distillates from cracked Mid-Continent gas oils and a number of others. Table III shows a comparison of the results obtained with various feed stocks.

In Table III the quality of the burning oils produced may be judged by the gravity of the "400" refined oil viscosity oil produced, this generalization having been proven by numerous lamp tests. Thus a cut of 400 vis. and 42 A.P.I. gravity would give a burning test about equivalent to that of a 400 vis. cut from Mid-Continent crude, and a cut of 400 vis. of 45 to 46 A.P.I. gravity would be equivalent to a Pennsylvania fraction of the same viscosity. All the hydrogenated burning oils have been found to be very stable.

The following points are worthy of note in Table III:

(1) The sulfur elimination is from 85 to 90% of the total despite the wide variety of sulfur forms encountered in the different stocks used. On a large scale 98½% of sulfur has been eliminated from a West Texas gas oil.

(2) Charging stocks of from 450 to 600 viscosity usually give the best yields (75 to 85%) of 400 vis. finished refined oil.

(3) In contradistinction to other methods of burning oil improvement now available, none of the charge is degraded. The entire hydrogenated product consists of burning oil and gasoline, both of which are more valuable than the charging stock. In other words, hydrogenation actually reconstructs the undesirable constituents present in the feed rather than separating them out

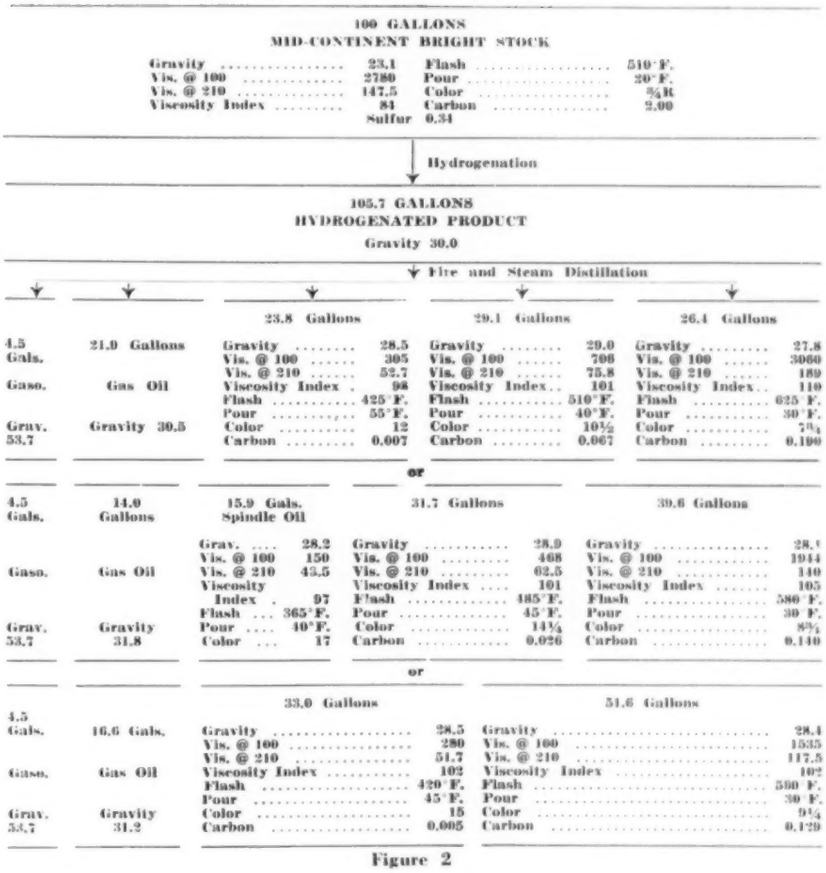


Figure 2

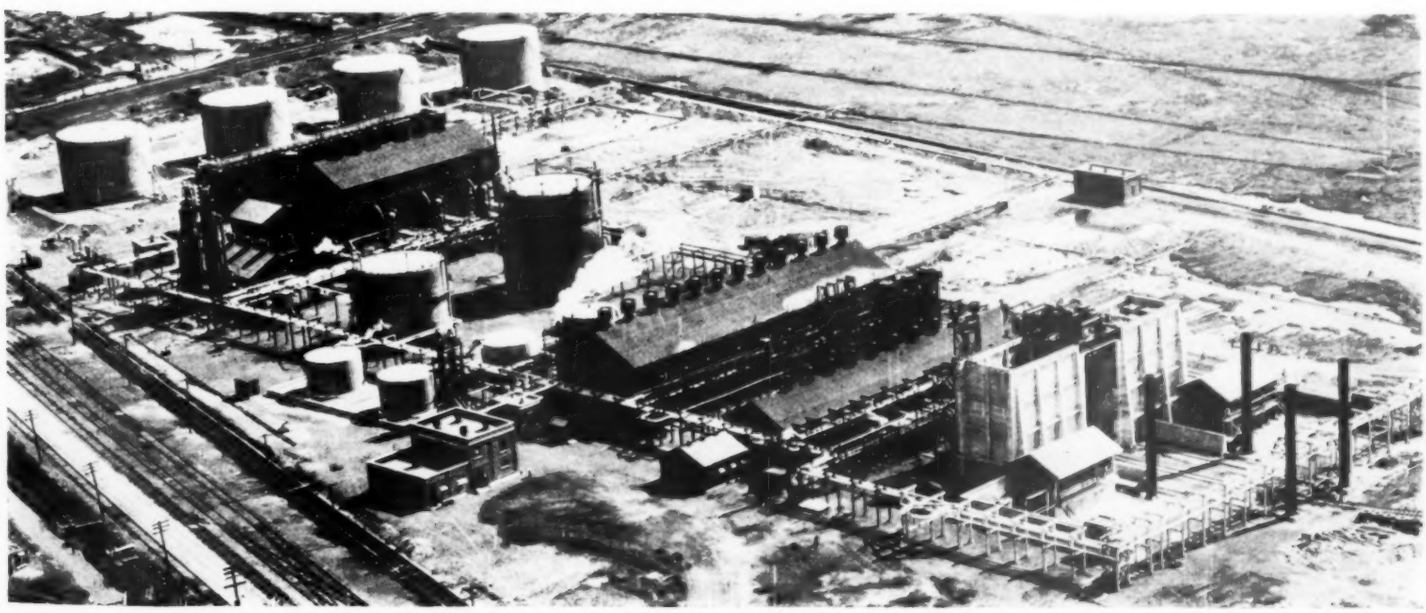


Fig. 1. General view of hydrogenation plant at Bayway, N. J.

* The term viscosity index used in these charts was devised by Dean and Davis, Chem.Met.Eng. Vol. 36, 618-9 (1929) and indicates the viscosity-temperature characteristics of the lubricating oil. Thus paraffinic oils such as Pennsylvania have a viscosity index of 100, and Coastal oils a viscosity index of from 0 to 20.

by some such method as solvent extraction.

(4) All the stocks, although differing widely in initial chemical characteristics, after hydrogenation equal the very highest A.P.I. gravity natural burning oils in physical characteristics. Analysis indicates that by hydrogenation (a) olefines are almost completely eliminated, (b) the greater portion of the aromatics are converted into naphthenes and paraffins and (c) there is very little *apparent* effect on the naphthenes, probably since new naphthenes are formed from aromatics in the charge, thus offsetting the improvement brought about as the original naphthenes are changed into more paraffinic compounds.

IV. Treatment of Naphthas for the Elimination of Sulfur and Gumming Tendency

In view of the remarkable facility with which catalytic hydrogenation eliminates sulfur, this process has been used for the treatment of natural or cracked naphthas. By a mild hydrogenation a high-sulfur, high-gum and unstable gasoline may be rendered stable, with about 50% of the sulfur eliminated under such conditions of operation that the anti-knock value is lowered only to about the same extent as would result from a slight chemical treatment. This phase of the process would be carried out in such a way that no appreciable change would be made in the boiling range of the naphtha. The process may also be so operated as to almost entirely eliminate sulfur from a high-sulfur, cracked naphtha, with a small increase and in some cases an actual decrease in knocking tendency. Depending upon conditions of operation, this treatment eliminates from 65% to 98% of the sulfur in the feed stock and gives a gum and color stable naphtha which, after a light wash with caustic soda, passes corrosion and doctor tests. The following tables show character of stock charged and finished product. Improvement in color, gum and sulfur is readily apparent.

100 GALLONS
MID-CONTINENT BRIGHT STOCK

Gravity	23.1	Pour	20°F.
Vis. @ 100	2780	Flash	510°F.
Vis. @ 210	147.5	Color	¾R
Viscosity Index	84	Carbon	2.00

Sulfur 0.34

↓ Hydrogenation

103.1 GALLONS
HYDROGENATED PRODUCT
Gravity 31.5

↓ Fire and Steam Distillation

7.2 Gals.	28.8 Gallons	67.0 Gallons	
Gaso.	Gas Oil	Gravity 29.4	Flash 480°F.
		Vis. @ 100 627	Pour 40°F.
		Vis. @ 210 74.0	Color 11¼
Grav. 53.1	Gravity 32.1	Viscosity Index 108	Carbon 0.026

or

7.2 Gals.	26.3 Gallons	37.3 Gallons	32.2 Gallons
		Gravity 29.7	Gravity 29.1
		Vis. @ 100 286	Vis. @ 100 1411
		Vis. @ 210 52.7	Vis. @ 210 118.5
		Viscosity Index 107	Viscosity Index 108
Gaso.	Gas Oil	Flash 440°F.	Flash 585°F.
		Pour 55°F.	Pour 35°F.
		Color 17	Color 10¾R
Grav. 53.1	Gravity 32.4	Carbon 0.006	Carbon 0.090

or

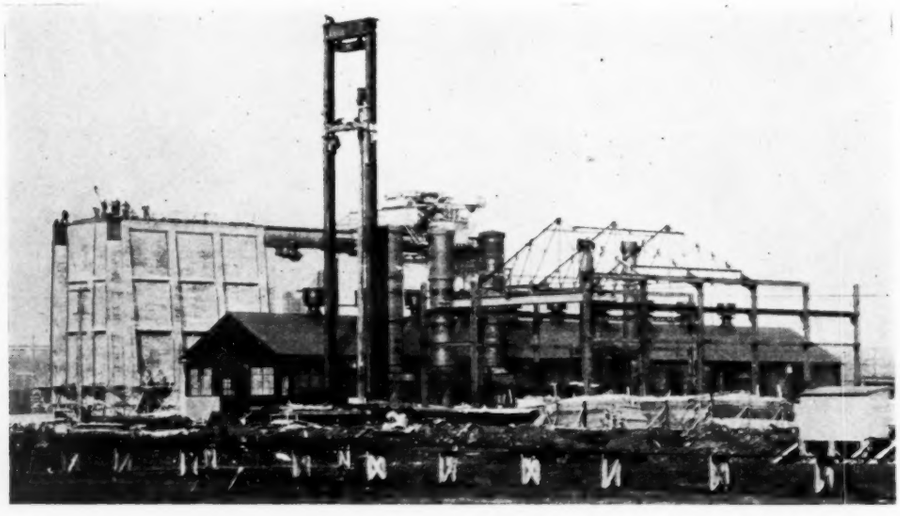
7.2 Gals.	17.2 Gallons	24.5 Gallons Spindle Oil	28.3 Gallons	25.8 Gallons
		Gravity 29.7	Gravity 29.8	Gravity 28.9
		Vis. @ 100 132	Vis. @ 100 440	Vis. @ 100 1744
		Vis. @ 210 42.8	Vis. @ 210 62.0	Vis. @ 210 131.2
Gaso.	Gas Oil	Viscosity Index 98	Viscosity Index 109	Viscosity Index 109
		Flash 360°F.	Flash 490°F.	Flash 605°F.
		Pour 45°F.	Pour 55°F.	Pour 35°F.
Grav. 53.1	Gravity 33.7	Color 18	Color 15	Color 9½
			Carbon 0.010	Carbon 0.106

Figure 3

V. Production of Stable Low-Knock Gasolines

The production of stable low-knock gasolines by hydrogenation, although carried out in the same equipment as those modifications described earlier, differs from them considerably in both aims and results. For example, in converting a fuel oil into gasoline and gas oil, or in up-grading a lubricating oil or refined oil distillate, hydrogen is added to materials naturally deficient in this respect. In other words, hydrogenation has served to saturate the hydrocarbon molecule and to render it more paraffinic. By suitably changing the operating conditions, but still utilizing the same equipment, the process may be reversed to yield stable, but non-paraffinic products. Thus, in one run on the hydrogenation pilot plant at Baton Rouge, using a Mid-Continent gas oil as charging stock, the first product made was a paraffinic burning oil of high gravity; without stopping operation, and merely by changing the conditions, the same charging stock yielded over 85% of a stable, low-sulfur gasoline having the same knocking tendency as 72.6% of iso-octane in n-heptane.

It will be recalled that in those adaptations of hydrogenation described earlier the volumetric yield is 100% or more. This is not the case in producing



Hydrogen gas plant and retorts under construction.

gasoline from gas oil, unless the knocking tendency is immaterial, the yield of gasoline being less than 100% if anti-knock quality is desired. In making anti-knock gasoline by hydrogenation, however, no tar or coke are formed and only two products are obtained; namely gasoline and gas. Any material not converted into gasoline in the first pass through the system is recycled.

The gasolines produced thus far have been practically sulfur-free, pass doctor and corrosion after lye-washing and are quite gum stable: in a few cases some treating has been necessary, but this has been very small in amount.

Some results obtained by this operation using light gas oils† are given in Table VI, which shows the properties of both the feed stock and product. It will be noted that better knock-ratings are obtained with more favorable stocks: i.e. with less paraffinic charging stocks it is possible to obtain higher yields of gasoline of given knock-rating, or much better knock-ratings for a given yield.

Table VII, on page 500, shows quite strikingly this influence of character of charging stock on knocking tendency of the gasoline produced. Thus:

The potential value of these highly anti-knock gasolines as blending agents is readily apparent, and many interesting combinations with cracking have been developed by experimentation, e.g. hydrogenation of cycle gas oils, to (a) increase gasoline yield (b) decrease refinery fuel oil production and (c) markedly better the knocking characteristics of the refineries' entire gasoline output.

The application of this phase of the hydrogenation process would appear to be wide, particularly as the need for low-sulfur, good knock-rating, stable gasoline becomes even more pronounced.

Conclusions

Consideration of the above illustrations leads to the following generalizations regarding hydrogenation:

(1) The type of hydrogenation employed in treating petroleum oils differs materially in all the major aspects from hydrogenation of the Sabatier type in that (a) hydrogen at high pressure is used, (b) the hydrogen is relatively impure and contains hydrogen sulfide, (c) the catalysts are sulfur resistant, and (d) relatively higher temperatures are employed.

(2) Long time runs of 6 to 8 months

† This adaptation of hydrogenation has thus far been applied mainly on gas oils having final boiling points of 650°F. or under, although some stocks with 40% or more boiling above this temperature have been found susceptible to this type of treatment. An investigation is now in progress to determine quantatively the influence of end-point and boiling range on the results obtained.

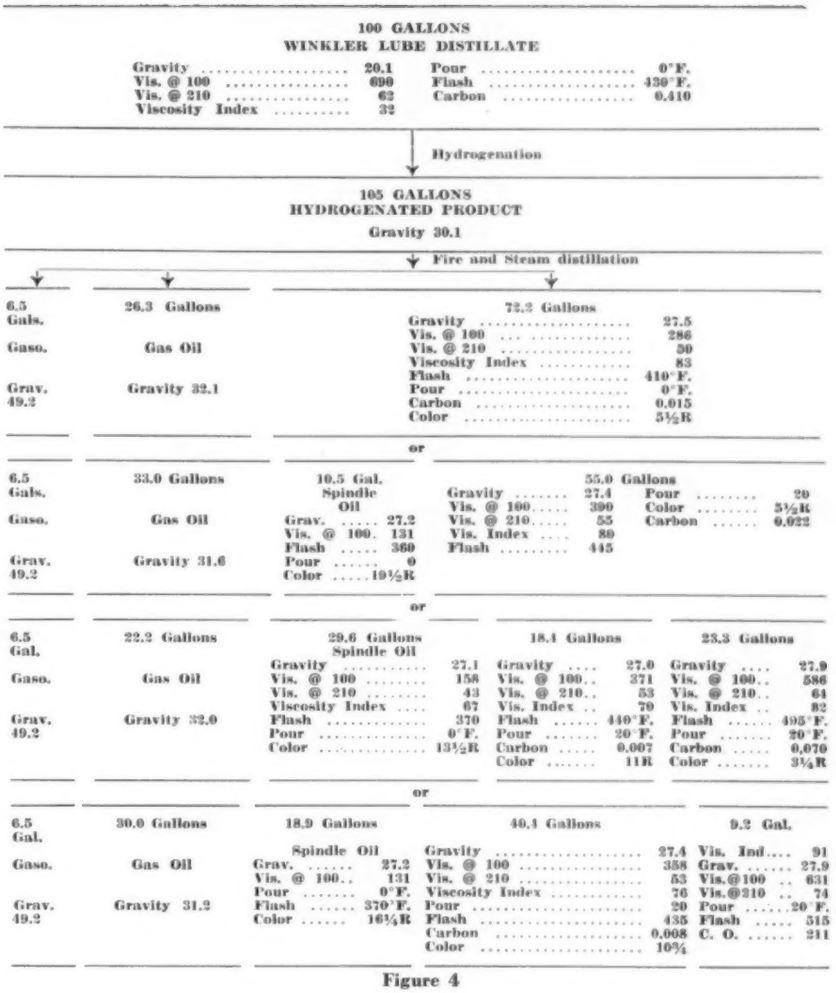


Figure 4

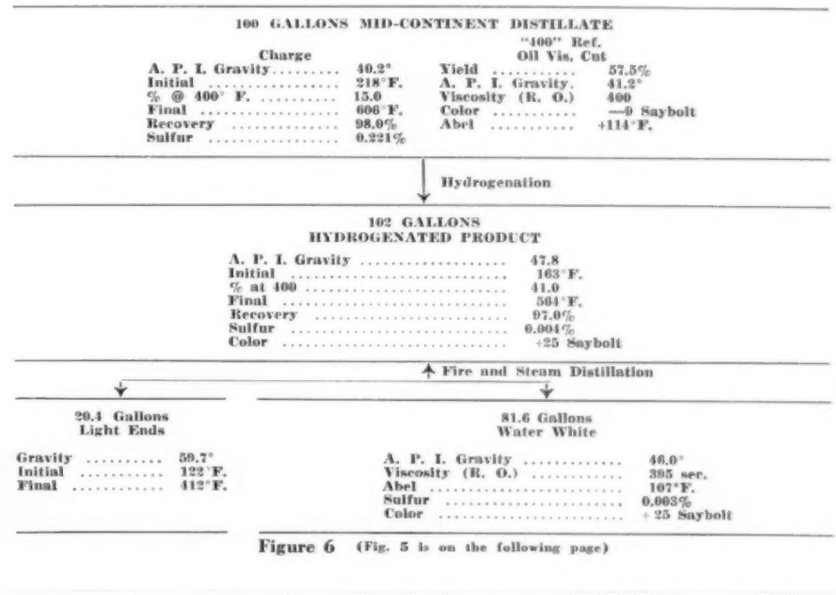


Figure 6 (Fig. 5 is on the following page)

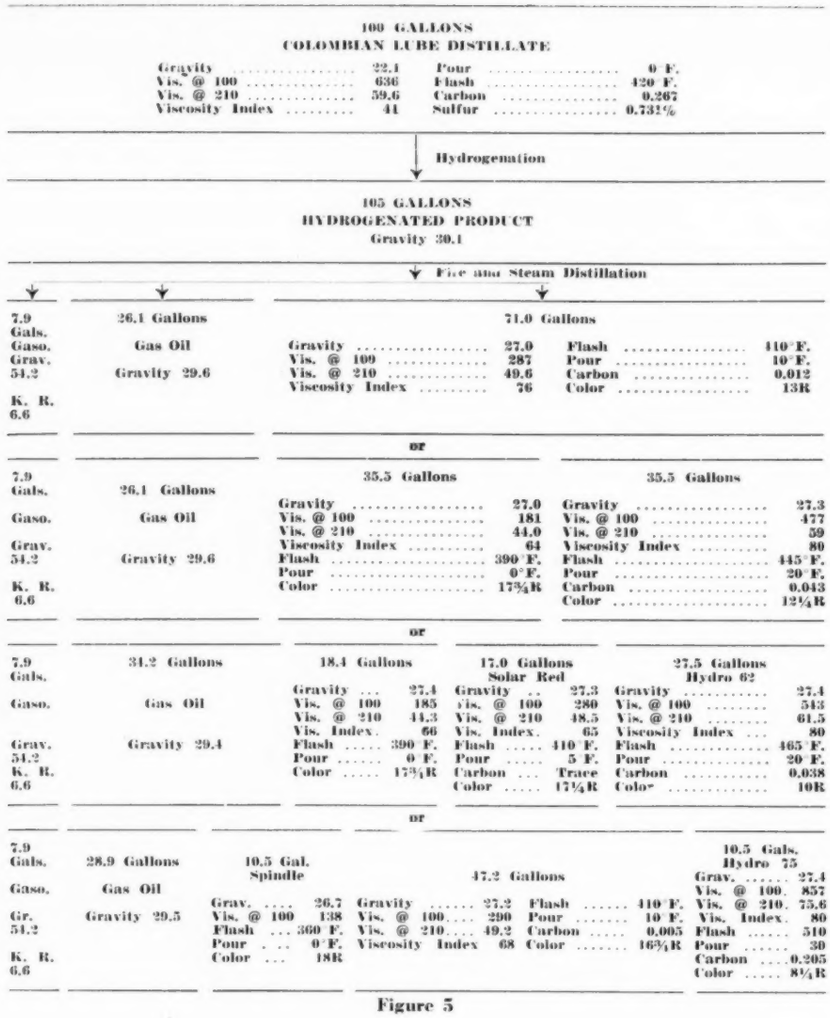


Figure 5

on commercial apparatus at high temperature may be made without coke or tar formation. The 90% point or the final boiling point of the product throughout the run may be less than that of the charging stock.

(3) Sulfur, an ever mounting problem in the oil industry, is readily eliminated. This holds true for all the forms of sulfur found in a wide variety of crudes. In a recent vapor phase operation on a unit producing over 2500 barrels of product per day the sulfur content was reduced from 0.708% to under 0.01%, or an elimination of over 98.5%. In general it may be said that when operating in liquid phase the elimination will be 60 to 75%, and in vapor phase from 80 to 99%.

(4) Asphaltic crudes of all sorts and residues from refractory crudes, as well as cracking plant tars can be converted to distillate products free from asphalt and low in sulfur with volumetric yields in excess of 100%. The hydrogenation process, therefore, offers the oil industry (a) a means of confining its production of heavy fuel to its economic market demand, and (b) a means of balancing crude production against the demand for refined white products, gasoline, Diesel fuels, burning oils and the like, independent of the natural, heavy fuel content of the crude.

(5) From mixed base crudes, highly paraffinic products such as gas oils, burning oils and lubricants may be produced. On the other hand, from paraffinic crudes so-called aromatic products may be formed, as for example, a highly anti-knock gasoline from a very paraffinic gas oil. Even from the same gas oil paraffinic burning oil and anti-knock gasoline may be made. Consequently from any given supply of crude the products of the quality desired may be produced by refineries employing hydrogenation.

(6) The flexibility of the process is very marked as to character of the charging stock and quality of product produced. Examples have been given showing how the same plant may be used (a) for producing gasoline and gas oil, (b) very paraffinic high A.P.I. gravity burning oils from mixed base gas oils, (c) color and gum stabilizing and desulfurizing highly cracked naphthas, (d) production of paraffinic lubricants from mixed base stocks and (e) production of anti-knock, high compression gasoline from paraffinic gas oils. Further, from the above examples it may be seen that from practically any grade of crude oil products of any desired quality may be produced.

(7) The hydrogenation process uses compressed hydrogen, a rather costly material. Offsetting this are the following factors: (a) the ability to balance crude run to white product demand, (b) the premium quality of products produced, (c) the low value charging stocks that may be used, and (d) the extreme utility of the process, due to its flexibility, especially where types of crudes to be refined and markets to be supplied vary from time to time.

(8) Because of the over supply of crude oil, hydrogenation in its present state of development may be considered as supplementary to present refining methods. It probably will supplant them as the supply of crude oil and demand for light products approach a balance.

Acknowledgment

The authors wish to acknowledge their indebtedness to many of their associates, particularly to the entire staff of the high-pressure research laboratory at Baton Rouge, and especially W. C. Asbury, M. W. Boyer, P. J. Byrne, Jr., G. H. B. Davis, W. V. Hanks and J. M. Jennings, and to E. M. Clark, president, and F. A. Howard, vice-president, of the Standard Oil Development Company.

Since the original research and development of high pressure hydrogenation of coal and oil has been one of the most if not the most costly process developments ever undertaken, the authors wish to express their respect for and admiration of the two corporations most directly responsible, the I. G. Farbenindustrie A. G. and the Standard Oil Company (New Jersey), and their respective presidents, Dr. Carl Bosch and W. C. Teagle.

FINIS

U. S. PRODUCTION REVIEW

	Daily Production bbl.	Daily Runs to Stills bbl.	Gasoline Stocks bbl.
Week Ending Sept. 20	2,419,744	2,440,900	37,260,000
Week Ending Sept. 27	2,382,217	2,501,700	37,222,000
Week Ending Oct. 4	2,378,645	2,391,700	36,441,000
Week Ending Oct. 11	2,361,657	2,371,000	37,125,000

Gasoline stocks considered sufficient at this season—about 25,000,000 bbl. Underlined figures indicate improvement in statistical position:— decrease in production, runs to stills or gasoline stocks.

Crude Oil Prices—Trend Down

THE crude oil prices in Mid-Continent Area were under pressure for several months past, with smaller operators offering crude as much as 25 per cent under the market. First actual sales under the market were reported from Texas Panhandle and from North Texas Districts. In Oklahoma the Champlin Refining Co. on October 13th reduced posted price in its area of Central and North Central parts of the State, the cut affecting the Oklahoma City and Seminole fields, and amounting to a reduction of 28.5 cents for the 39 degs. Be crude, from $1.39.5 to $1.11 per barrel. The Western Oil Co. of Southern Oklahoma on October 16th posted a reduction equal to 38.5 cents for the 39 degs. Be crude, this cut being met by the American Refining Co. On October 15th and 16th all purchasers posted reductions in North Texas Area (10.5 to 16.5 cents per bbl.) and in Texas Panhandle (13.5 to 26.5 cents per bbl.), this cut affecting approximately 140,000 bbl. of daily production, and being the first general downward revision. Additional reductions elsewhere in Mid-Continent Area are expected.

Proration

ON October 14th the State Supreme Court of Oklahoma sustained the Oil Conservation Act of 1915, under which the Corporation Commission has been issuing its proration orders. The power of Corporation Commission to order drastic proration has been challenged on two counts:—(1) that there was no actual waste of oil in the State and (2) that the proration was in effect a price fixing operation. The opinion of the Supreme Court read in part that the order of Corporation Commission is a "valid method of preventing waste of oil; is a proper exercise of the police powers of the State, and the Julian Oil Co. has not been deprived of any of its State or Federal constitutional rights," also that the power of Corporation Commission "to make rules and regulations to prevent waste of crude oil and leaving the commission the power to determine what constitutes waste is not such a delegation of power to the Commission as to render the act unconstitutional," and also that "the enforcement of the conservation act and of these orders may have some influence on the price, but if so, the same is merely incidental and not the primary purpose thereof." The Julian Oil Co., aided by the Champlin Refining Co., is continuing its efforts to break the proration, and the case may eventually be carried to the U. S. Supreme Court. Meanwhile hearings are held in Oklahoma City before the Corporation Commission for and against the present proration schedules and methods.

In Texas the Railroad Commission is in considerable difficulties having two injunctions filed against it, preventing its interference with operations of the Danciger Oil & Ref. Co. in Texas Panhandle and of the Young Bros. and Alexander in the Riggs Pool of Young County, North Texas. A test case will therefore be made to determine the power of the Commission to issue orders curtailing production, this power being based upon the recently enacted Pipe Line Law.

It is apparent therefore that while the producers are managing to keep the crude oil output down to sensible figures, such action is meeting very considerable opposition from certain smaller independent operators, who own localized production and have means of refining and marketing it. In the case that the proration orders will be overridden by present court actions, it is entirely possible that crude oil will be cut temporarily in offending pools to 50 cents or less per barrel, as was done in California.

Oklahoma—Oklahoma City

THE number of producing wells reached 600, while about 170 wells are being drilled. Indicated potential production based on short tests is at this time in excess of 3,500,000 bbl. per day, actual prorated production continues to average around 90,000 bbl. On the Northwest side of the field a very rich sector was opened, the production coming from the Wilcox Sand of the Simpson Series. The more spectacular completions of last few weeks include:—

Outstanding New Wells in Oklahoma

Oil Incorporated	No. 1 Ross	estimated 90,000 bbl.
Skelly Oil Co.	No. 1 Hurt	estimated 77,000 bbl.
British-American	No. 1 Escroat	estimated 72,000 bbl.
Hall & Briscoe	No. 5 Holmes	estimated 67,000 bbl.
Minnehoma-Getty	No. 1 Pugh	estimated 60,000 bbl.

(all estimates based on short production tests)

The Phillips Petroleum Co. and the T. B. Slick interests own most of the acreage in this area which covers the east half of section three and the central portion of section ten—T11N—R3W. These two concerns will accordingly benefit most in this rich sector, especially so because the development will be reasonably slow and the more normal spacing of the wells will not require excessive drilling costs.

New Mexico—Hobbs

THE indicated potential production in this field reached 819,193 bbl. per day from 95 completed wells. 50 wells are drilling at this time. New completions by January 1st, 1931, will increase the potential to over 1,000,000 bbl. The allowed production for the second half of October was 31,715 bbl. per day, or about 4 per cent of the potential. The proration is effected by pinching the wells into the required fraction of their open flows, thus conserving the gas pressure. The allowance by wells is figured on the basis of the open flow and on the basis of unit acreage (40 acre units), a system which has been most successfully used in Yates Pool of Texas.

Texas—Van

THE indicated potential of the Van Pool is at this time estimated as being in excess of 750,000 bbl. per day, from 130 completed wells. The prorated daily production is 27,500 bbl., the wells pro-

ducing through chokes. The Van Pool is the only major flush pool in United States operated on unit basis successfully, probably because one company, the Pure Oil, controls about 80 per cent of the proven acreage. However the Northeast extension of the Van Pool is outside of the originally unitized area, and some competitive drilling took place there. Pure Oil Co. and Humble Oil Co. are principal owners in the Northeast extension, while two minor interests have been responsible for non-unit operation of the extension. The Van Pool is the most desirable producing area in United States at this time:—the depth to the producing formation is very shallow, averaging about 2,600 feet; the oil is of high gravity and sweet; the producing sand, the Woodbine, is remarkably thick, reaching 600 feet, and shows good saturation throughout. The estimates of recovery per acre run as high as 200,000 bbl. The Pure-Van Pipe Line Co., a 10 inch-45,000 bbl. per day, carrier serves the field, connecting it with the Gulf Coast. The Humble Oil Co. (S. O. of N. J.) is building the second line into the field, also a 10 inch carrier connecting with Humble's trunk system at Shreveport, La. The oil reserves of Van Pool are far in excess of Pure Oil requirements, and the near future may see sale of a portion of Pure's holdings in the Van Pool to major interests not protected by large reserves of high gravity crude oil.

California—Playa Del Rey

THIS field which gave much promise early this year has gradually diminished in importance until today its anticipated peak does not exceed 30,000 bbl. per day.

California—North Belridge

IN the North Belridge field, which is an old producer of heavy oil, the Belridge Oil Co. Fee No. 15, SW. corner 26-27-20, was completed for 2,750 bbl. from 5,457 feet, the flow being accompanied by 55 million cubic feet of gas. This production is derived from the Temblor Zone, which was topped at 4,965 feet. The oil is of high gravity, testing 46.2 deg. Be. Also the Richfield Oil Co. No. 1 Belridge, NW. SW. SW. 22-27-20, situated about 1½ miles due northwest from Belridge Fee No. 15, topped the Temblor Zone at 4,960 feet and is drilling now at 5,000 feet, being considered as a definite extensioner. The Temblor Zone is the producing horizon in Kettleman Hills, 25 miles due Northwest from the North Belridge Field, where its top is encountered at about 7,000 feet. While in Kettleman Hills a completed well costs as high as $300,000, in the North Belridge the cost is under $100,000, also the time required for drilling will be very much shorter. It appears therefore that the North Belridge is more desirable to operate at this time, inasmuch as it is located in flat country and within easy reach of pipe lines. Also the oil is easier to handle than the extremely light Kettleman Hills' crude. The tentatively proven acreage in the North Belridge Field in the Temblor Zone is distributed as follows:—

Belridge Oil Co.	2,500 acres
Associated Oil	300 acres
Union Oil Co.	200 acres
Standard Oil of Cal.	200 acres
Richfield Oil Co.	100 acres
Texas Oil Co.	100 acres
Continental Oil Co.	80 acres
Ohio Oil Co.	80 acres
Total	3,560 acres

Future drilling may somewhat increase the above estimated area, which will benefit the Belridge Oil Co. most, because its holdings are the largest in the area.

The major importance of this discovery is due to its proving the extension of the Temblor Zone from the Kettleman Hills due southeast and its practically certain productivity in the fields adjoining the North Belridge, more particularly in the Lost Hills and in the South Belridge. This discovery, which is considered most important since the opening of the Kettleman Hills, further emphasizes the great oil reserves of the San Joaquin Valley.

BASIL B. ZAVOICO.

▼

World Oil Production
September, 1930

	Barrels (7 Bbl. per ton)
United States (A.P.I.)	72,403,250
Russia & Sakhalin (Official)	11,689,433
Venezuela (Private)	11,310,770
Roumania (Official)	3,045,000
Neth. East Indies & Sarawak/(Est.)	2,750,000
Persia (Anglo-Persian)	3,572,520
Mexico (Official)	3,242,929
Colombia (Official)	1,638,926
British India (Estimate)	950,000
Peru* (Estimate)	950,000
Trinidad (Official)	837,347
Argentine (Estimate)	750,000
Poland (Official)	394,100
Japan & Taiwan (Estimate)	175,000
Egypt (Approximate)	146,111
Ecuador (Official)	127,189
Canada† (Estimate)	135,000
Iraq (Estimate)	45,000
Others (Germany, France, Czecho-Slovakia, etc., *estimate*)	165,000
Total	114,327,575

/ Sarawak separately, 49,132 bbl. (Official)
* Intl. Petr. Co. separately, 751,110 bbl.
† Turner Valley 100,658 bbl.

World Oil Production
August, 1930

	Barrels (7 Bbl. per ton)
United States (Official)	74,853,000
Russia & Sakhalin (Official)	11,529,700
Venezuela (Private)	11,378,374
Roumania (Official)	2,942,289
Neth. East Indies & Sarawak/(Est.)	2,750,000
Persia (Anglo-Persian)	3,413,900
Mexico (Official)	3,448,543
Colombia (Official)	1,747,202
Peru* (Official)	990,573
Argentine (Estimate)	950,000
Trinidad (Official)	793,666
British India (Estimate)	700,000
Poland (Approximate)	395,000
Japan & Taiwan (Estimate)	175,000
Egypt (Approximate)	151,627
Ecuador (Official)	137,642
Canada† (Official)	136,056
Iraq (Estimate)	45,000
Others (Germany, France, Czecho-Slovakia, etc., *estimate*)	165,000
Total	116,702,572

/ Sarawak separately, 51,812 bbl.
* Intl. Petr. Co. separately, 766,249 bbl.
† Turner Valley separately, 99,423 bbl.

▼

Late Russian Notes

WILDCATTING by the Azneft for 11 months of this year amounted to 23,300 meters, or approximately 1/3 behind the schedule. It is, however, proposed to have the shortage taken care of next year by drilling 73,000 meters.

Very shortly there will be put in operation a pipe line of 14,000 bbl. capacity of crude per day. It is of similar type to the Shukhov-Capelushnikov line of 7,000 bbl. per capacity built almost entirely in Russia.

▼

A Correction

IN our October issue the name "Standard Oil Co. of Indiana" was inserted in parenthesis after that of the Huastecas Oil Fields Corporation. This of course was an error, as the Huastecas Oil Fields Corporation has no connection whatsoever with Huasteca Petroleum Company that is one of the subsidiaries of the Standard Oil Co. of Indiana.

▼

Shipping

ONE of the two 18,000 tons d.w. high-pressure steam driven tankers built at the Federal shipyard, Kearny, N. J., for the Standard Oil Co., of N. J., and forming one of nine new tankers of this oil company's current program, was launched on Oct. 11th, and named the W. S. Farish. She is one of the most modern oil carriers yet built, and is constructed on the Isherwood bracketless system. The sister ship G. Harrison Smith, was recently launched and delivered. Her cost is about $2,000,000.

FINANCE

New York

THIS month's tabulation gives a clear picture of general conditions throughout the market. Trading was in notably greater volume than at any time since the end of the previous decline in June, and the fall in quotations was so severe and so widespread that very many issues broke through the lows of last November. Oil shares have been in an unfavorable position because of the approach of the season of slack consumption and the advent of lower gasoline prices; furthermore it is becoming more and more evident that 1930 earnings will fall below levels of the past two years, and uncertainties as to the outlook for next year continue to prevail in both crude and refined branches because of over capacity and the constant threat of overproduction.

DIRECTORS of Richfield Oil Company of California have omitted common dividend payments. Curtailment of crude output, together with lower gasoline prices, and expenses incident to extensive marketing expansion along the Atlantic seaboard combined to reduce consolidated net for the first half of the year to the equivalent of about 1 cent per common share. Absence of nonrecurring charges on account of expansion should result in a better showing for the current six months.

It is reported that several tentative proposals involving merger have been advanced for consideration of directors, including offers from Union Oil and from Tide Water Associated.

UNION OIL COMPANY OF CALIFORNIA reports for the nine months ended September 30 estimated net profits after all charges equal to $1.84 per share in comparison with the $2.94 earned in the same period of 1929 on a slightly smaller number of shares. Financial position was reported very strong with current assets of $78,500,000 against current liabilities of $9,700,000, a ratio of better than 8 to 1. The earnings record this year clearly shows the effects of the unfavorable conditions in the gasoline market on the West Coast this past summer.

ON September 30 Independent Gas stockholders voted to sell assets of the company to Phillips Petroleum in consideration of a block of the latter company's common stock equal to 76 shares for each 100 shares of Independent outstanding. Another stockholders' meeting has been called for November 8 to vote on dissolution of the Independent company and distribution of its assets (Phillips common) among stockholders.

IT is reported that H. L. Doherty & Co. has acquired a controlling interest in Louisiana Oil & Refining for the account of Arkansas Natural Gas, a subsidiary of Cities Service. Operations of these two companies are in the same general territory and close coordination should result in mutual benefit. Cities Service is a holding company representing one of the largest enterprises of the country and derives its revenues, in not far from equal proportions, from the utility industry and from oil and natural gas operations.

STOCKHOLDERS of Creole Petroleum, controlled by Standard Oil of New Jersey, will meet on November 7 to approve increase in authorized capital stock from 6,000,000 to 7,000,000 no par shares. If approved, rights will accrue to holders of record November 21 to purchase additional shares at $4.25 each in the ratio of one new share for each six old shares held. The privilege is to expire December 29. The new funds are to be used in further development of the company's Venezuelan concessions, and Standard of New Jersey has agreed to exercise its proportion of the rights and in addition to purchase at the subscription price all of the allotment not taken by other shareholders. With the stock around 4½, as it was on October 15, the rights have no theoretical value, and Standard will probably be called upon to take up much more than its proportionate share of the offering, thereby increasing its percentage of control of the company. Information concerning Eastern Venezuela will be found on page 491.

New York Stock Prices

1930 High	1930 Low	Current Div. $ per Annum	Stock (Par Value $)	Sales (Shares)	September 15 to October 11 First	High	Low	Last	Net Change[1]
51⅝	22⅝	†2.00	Atlantic Refining (25)	183,800	34	34	22⅝	25	— 9⅛
34	15⅝	2.00	Barnsdall A (25)	136,200	22⅝	22½	15⅝	17⅛	— 4⅝
8¼	2⅝	....	Colon Oil (No)	6,400	3⅝	3⅞	2⅝	2½	— 1⅛
30½	13	....	Continental Oil (No)	195,100	19¼	19¼	13	13⅝	— 5⅝
7⅝	4½	....	Creole Petroleum (No)	71,800	5⅝	5⅝	4½	4⅞	— ⅝
166¾	90	1.50	Gulf Oil Corp. (25)	53,300	118½	119⅞	90	91	—29
119	74⅝	2.00	Humble Oil & Ref. (25)	41,900	88½	88½	74⅝	75	—13½
30	16½	0.50	Imperial Oil, Ltd. (No)	73,200	22½	23½	16½	17⅝	— 5⅛
28⅜	6½	....	Indian Refining (10)	223,800	14⅛	14⅛	6½	7½	— 6½
24	14	1.00	International Petr. (No)	118,500	19	19	14	14⅝	— 4½
37	15	....	Mexican Seaboard (No)	315,900	24¼	24½	15	16½	— 8
32	22	2.00	Ohio Oil (No)	157,200	30⅝	30⅝	22	23	— 7½
67½	47⅜	....	Pan Amer. P. & T. B (50)	22,100	54	56⅞	47⅜	49½	— 4½
44¾	21	**2.00	Phillips Petr. (No)	205,900	32⅞	32⅞	21	22¾	—10¼
54	22	2.00	Prairie Oil & Gas (25)	30,500	34½	34½	22	27	— 7½
27¼	16¼	1.50	Pure Oil (25)	104,900	19½	19⅝	16¼	16½	— 3¼
28¼	7⅜	....	Richfield Oil (25)	198,400	16⅞	17	7⅜	8⅜	— 8½
56½	43¼	*3.20	Royal Dutch (N.Y.) (13⅓)	76,000	48¼	48½	43¼	44	— 4¼
25½	10⅛	....	Shell Union (No)	93,300	14½	14⅜	10⅛	10½	— 3⅞
32	15	2.00	Sinclair Consol. (No)	386,600	21¼	21½	15	15⅞	— 5⅝
42	20⅛	2.00	Skelly Oil (25)	47,800	26⅞	27	20⅛	20¼	— 6⅝
75	52⅛	2.50	Standard Oil of Calif. (No)	140,100	60⅞	60⅞	52⅛	53	— 7½
59⅞	41	2.50	Standard Oil (Ind.) (25)	215,400	49½	49½	41	42⅜	— 6⅝
40½	26	1.60	Standard Oil (Ky.) (10)	38,700	31	31	26	26⅝	— 4¼
84⅞	55⅛	†2.00	Standard Oil (N. J.) (25)	925,700	69⅜	69⅜	55⅛	56⅞	—13¼
40⅝	26½	1.60	Standard Oil of N. Y. (25)	265,100	31	31	26½	27	— 3⅞
70	52	§1.00	Sun Oil (No)	6,100	59	59	52	52¼	— 6⅞
60½	42⅞	3.00	Texas Corp. (25)	285,300	51½	51⅞	42⅞	44	— 8
17⅞	10	0.60	Tide Water Assoc. (No)	159,800	13⅛	13⅛	10	10	— 3
50	28⅝	‡2.00	Union Oil of Calif. (25)	50,400	39⅝	40	28⅝	32	— 8
97⅞	65⅛	4.00	Vacuum Oil (25)	63,600	78	78½	65⅛	66½	—11½
4½	1⅝	....	Venezuelan Petr. (5)	21,300	2⅝	2⅝	1⅝	1⅝	— ½

[1] Since close of last month's table. * Paid last year—no regular rate. ** Plus 5% in stock. † Including extras. ‡ Plus 4% in stock. § Plus 9% in stock.

FOR the eight months ended August 31 it is reported that earnings of Barnsdall after all charges were sufficient to cover full dividend requirements for the year of $2 a share. This would indicate approximately $2.25 earned in the nine months ended September 30, which would show a moderate decline from the $2.53 reported for the first nine months of 1929.

VACUUM OIL COMPANY is continuing its policy of expanding its distribution facilities in this country and has announced acquisition of Wadhams Oil Corporation of Milwaukee on the basis of nine shares of Vacuum for each ten shares of Wadhams.

ATLANTIC REFINING COMPANY reports a net profit of $4,844,000 for the first nine months of 1930, or $1.80 per $25 par share on 2,691,111 shares outstanding. This compares with $13,687,000 for the same period last year on 2,670,551 shares then outstanding.

C. C. BAILEY

Paris

FOLLOWING the decision taken by the shareholders of the Compagnie Francaise des Petroles, at the Annual Meeting held on August the 11th, to increase the company's capital, the new financing managements were made during the latter half of September. 110,400 new "B" shares carrying one vote only have been issued. Their nominal value is Frs. 500.— and they will be entitled to the same dividend on January 1st, 1931, as the other outstanding shares.

Shareholders had a prior right to subscribe to 100,000 of these shares, at the rate of one new share for three old "A" or "B" shares. The Board of Directors disposed of the remaining 10,400 shares and allotted them to whom they pleased.

It is known that the *Union des Mines et Péchiney* have subscribed to a certain number of the new shares, which have been issued at a premium of Frs. 50.

A GENERAL MEETING of the stockholders of the Cie Standard-Franco-Americaine has been called for the 16th of October. It is rumored that the Board of Directors will propose a dividend of Frs. 30.— for the financial year ending on June 30th.

It must be remembered that the decision to prolong the Company's financial year for a period of six months (from Jan. 1st to June the 30th) was taken at an Extraordinary Shareholders Meeting held on June 3rd this year. Administrative reasons were invoked for so doing, but in reality the dividend of Frs. 30 only covers one year's business. At the same Extraordinary Meeting the Board of Directors was authorized to increase the Standard Fr. A. Capital from Frs. 60,000,000 to Frs. 200,000,000 and this was done (in part) during July when 210,000 new shares were issued at Frs. 805.— with a nominal value of Frs. 500.6.

THE Société Lille-Bonnieres & Colombes announced a turn-over of over half-a-billion francs for the financial year ending on March 30th, 1930; profits, however, were not in keeping with the turn-over. A dividend of Frs. 70.— was proposed as remuneration for preferential shares, and one of Frs. 45 for ordinary shares.

The President of the Company, M. Palliez assured the shareholders that in spite of small profits the company's position was excellent. Reserves exceed immobilizations, which only amount to 49 millions. It is chiefly the fact that the French Parliament has not yet ratified the Agreement with the C. F. P., and that licenses to import crude-oil have not yet been granted, that is creating a difficult situation for many of the bigger companies on the French market. They are also troubled by competition created by the number of small importers, whose situation on the market cannot be defined, they have no clientele, and yet they inconvenience the bigger firms. M. Palliez seems to think that their existence will not be a very long one, and that therefore an optimistic view of the company's position is justified.

Lille-Bonnieres & Colombes is one of the major distributing companies in France. It owns five terminal stations at Rouen, Dunkerque, Calais, La Rochelle, and Saint-Louis-du Rhône, and forty dépôts in various parts of the country. The Company was originally founded at Lille in 1877, but amalgamated with the Sté des Huiles Minérales de Colombes in 1909 and has developed continuously since that date. It holds shares in several other French and foreign companies, and in April, 1929, took over a participation of 7.64% in the Cie Francaise de Raffinage.

ON the 24th of September shares of the Etablissements Henry Hamelle were officially quoted on the Paris Bourse for the first time. The Company was founded in 1911 and chiefly handles lubricating oils. Although the Capital is small, only 7,500,000 Frs., the company has an excellent standing on the market, and is very well quoted in industrial circles. Profits have increased steadily each year. The Etablissements Henry Hamelle are the exclusive agents of the Valvoline Oil Co. of New York.

GROSS profits of the S. A. ANDRE FILS amount to 13,988,613 frs. for 1929 as against 1,538,623 frs. in 1928. Net profits figured out at frs. 4,826,613 against 435,843 frs. in 1928. Sums put aside for depreciation have now attained 28,583,322 frs. and capitalization frs. 69,892,785. ANDRE FILS is the largest French distributing organization for lubricating oils and was founded in 1900. It now imports and sells nearly one-

Paris Bourse

Div.	Prix	Nom des valeurs	Cours du 11 Sept.	plus haut	plus bas	Cours du 2 Oct.	Chgmt.
50 lei	500 lei	Astra Romana	159	159	140	140	—19
50 lei	500 lei	Colombia	114	120	114	116	+ 2
50 lei	500 lei	Concordia	112	115	104	104	— 8
.	500 F.	Cdré. Gal des Pétroles act	....	....	....	....	.....
	500 F.	Cdré. Gal des Pétroles par?	7825	8000	7525	7525	—300
	500 F.	Franco Pol. Pétroles act	111	111	101	101	—10
	500 F.	Franco Pol. Pétroles part	385	405	370	370	—15
		Franco Wyoming	468	468	427	427	—41
20 Frs.	500 F.	S.G. des Huiles de Pétroles act	565	581	558	580	+15
	500 F.	" " part	252	260	250	240	—12
	500 F.	C. Française des Pétroles	640	640	613	....	.....
50 Frs.	500 F.	C. Industrielle des Pétroles.	1000	1030	1000	1000	.....
65 F.	500 F.	Lille Bonnières Colombes prio	1160	1200	1048	1048	—112
40 F.	500 F.	" " ord	742	777	710	710	—32
	500 F.	Malopolska act	203	209	185	185	—18
40 F.	500 F.	Malopolska part	2195	2230	2055	2055	—140
40 F.	500 F.	Mexican Eagle	.....	.....	.....	128	.....
17.50	250 F.	Omnium Inter. des Pétroles.	160	163	151	151	— 9
50 Frs.	500 F.	Péchelbronn	900	959	889	889	—111
60 F.B.	500 F.B.	Pétrofina	577	590	560	560	—17
240 fl.	1000 Fl.	Royal Dutch	37750	38000	35175	35175	—2575
24 fl.	100 Fl.	Royal Dutch 1/10	3785	3795	3565	3565	—220
5 sh.	1 lg.	Schell	555	558	519	519	—36
25 Frs.	500 Frs.	Steaua Française	202	214	182	182	—20

quarter of the lubricating oils consumed in France, mostly imported from the U. S. A. With the prospect of constructing a refinery at Port Jerôme in view, ANDRE FILS has come to an agreement with the Standard Fr. Américaine, as a consequence of which ROBERT ANDRE, one of the three brothers who own the concern was elected a Director of the S. A. STANDARD FRANCO-AMERICAINE.

E. J. ANDRE

▼

London

ANY popularity which the London oil share market enjoyed earlier in the year has now completely disappeared, and prices have tended to conform to the general tendency of speculative markets. Surrounding conditions in the Stock Exchange have not been too helpful, and in addition, oil shares have had their own peculiar troubles to face. The announcement of a reduction of 2d. per gallon in British petrol prices, with lower prices for kerosene, administered an unexpected shock, and a considerable volume of selling from the Continent had to be absorbed here. These factors far outweighed the continued improvement in American consumption statistics, especially as it is realized that the period of the year has now commenced when consumption of petrol is likely to decline. A number of leading shares, including Mexican Eagles and Shell Transports, touched new low levels for the current year following the petrol price reduction. The movement is believed to have been due largely to short sales. This view is confirmed by fact that bear repurchases have since been responsible for a moderate recovery, although the market appears likely to require a strong stimulant before it regains its former firmness.

A DEMAND for Anglo-Equadorians, based on anticipations of an increased dividend, was reported at the end of September. The company entered the dividend list for the year to June 30, 1929, with a distribution of 3½ per cent, and the market expects something better this time. This, however, has not prevented the shares from relapsing, and carrying those of Lobitos Oilfields, the parent undertaking, back to a new low figure for 1930.

TRINIDAD Leaseholds £1 shares achieved the doubtful distinction of registering the heaviest decline during the the past few weeks, the low figure of 1 15/32 being reached. This represented a fall of 11/16, or over 30 per cent, from the figure ruling in middle of September. It is considerably less than half the highest price of the year. A heavy seller appeared at the end of last month, and shares coming on an unwilling market forced down the price rapidly, while a further decline followed rumors that the directors contemplate offering the remainder of the company's authorized capital to shareholders in the proportion of one new share for every seven shares held. The price, however, reached its lowest point after the petrol price reduction, the company having recently entered the distributing business by purchasing the petrol distributing branch of Burt, Boulton and Haywood. A fresh slump followed the directors decision to pass the final dividend owing to general conditions and to the necessity of conserving resources. Thirty per cent dividend was paid in 1928-29.

ALTHOUGH the reduction of 2d. per gallon in the price of petrol was responsible for a severe decline in oil share quotations, it was naturally welcomed by British motorists and owners of commercial cars. A revenue of £16,000,000 is derived by the British Government each year from the petrol tax of 4d. per gallon, so that that difference between the old price of 1s. 6½d. and the 1s. 4½d. now in force in London, with corresponding reductions in outlying areas, represents a saving of £8,000,000 per annum to consumers, apart from savings effected through the lower price of kerosene. In announcing the price change, the National Petroleum Distributing Companies referred to weaker prices for petrol and kerosene in America, and lower tanker freights. The first of these two influences was probably the more potent, and a distinct decline in United States gasoline prices has occurred since the previous change in the British quotation.

THIS fact has led to the suggestion here that America is only now giving British consumers the benefit of economic conditions which have operated for a long time. This may be perfectly true, but it must not be overlooked that most of the big British-owned oil undertakings operating in the East and elsewhere have their own petrol distributing organizations, and evidently have the market pretty well organized. The news that the National Petroleum Distributing Companies were reducing their selling prices coincided with reports that the American Petroleum Export Association was allowing its members to reduce prices by 2 cents per gallon on petrol destined for the United Kingdom, and 1½ cents for certain Continental countries. It appears, therefore, that lower prices resulted from an agreement between all the principal concerns, British as well as American, operating in the British market. If this is the case, all were equally responsible for maintaining the higher level of petrol prices previously in force. There is no evidence to show that this price for Britain was not up to time of reduction justified, and it is worth recalling that when suggestions were made a few years ago that the British petrol user was being fleeced, the companies concerned soon put out figures justifying the prices.

London Stock Exchange Prices

1930 High	1930 Low	Last Year's Div. % per Ann.	Share	September 16 to October 7 First	High	Low	Last	Change
1 1/32	11/16	3½	Anglo-Ecuadorian	11/16	11/16	5/8	11/16	— 1/32
2 5/8	2	22½	Anglo-Egyptian "B"	2 1/32	2 1/32	2 1/32	2 1/32	— 1/8
4 3/16	3	20	Anglo-Persian	3 5/8	3 5/8	3 1/4	3 1/4	— 3/8
1 1/16	5/8	52½	Apex Trinidad (5s.)	11/16	11/16	5/8	5/8	— 1/32
2	1/4	....	Attock	1 1/4	1 1/4	1 1/32	1 1/8	— 1/8
5/8	1/16	12½	Brit. Borneo (10s.)	1/16	1/16	1/16	1/16	— 1/32
1/16	1/32	7½°	Brit. Burmah (8s.)	1/32	1/32	1/32	1/32	— 1/32
1/4	1/16	....	Brit. Controlled ($5)	1/32	1/16	1/32	1/32	.....
5/8	1/32	....	Do. Prefd. ($5)	1/32	1/32	1/32	1/32	— 1/32
4 3/16	3 1/16	30	Burmah	4 1/32	4 1/32	3 3/4	4	— 1/32
1/16	1/32	12c	Canadian Eagle (No par)	1/16	1/16	1/16	1/16	— 1/32
1 1/2	1/16	....	Creole Petroleum (No par)	1 1/32	1 1/32	1	1/16	— 1/32
1/32	1/32	....	Kern River (10s.)	1/32	1/32	1/32	1/32	— 1/32
2 1/16	1 1/16	12½	Lobitos	1 1/16	1 3/16	1 1/16	1 1/16	— 1/32
3/4	1/16	6	Mexican Eagle ($4 Mex.)	1/32	1/32	1/16	1/16	— 1/32
68	51	....	Pan American "B" ($50)	56	56	54	54	—2
1 1/8	1/16	5	Phoenix	1/32	1/32	1/16	1/16	— 1/32
35 1/4	28 1/32	24	Royal Dutch (fl. 100)	30 3/4	30 1/2	28 1/32	28 1/32	—2 1/32
4 1/16	4 1/32	25°	Shell Transport	4 1/16	4 1/16	4 1/32	4 1/32	— 1/4
1/2	1/32	4	Steaua Romana	1/16	1/16	1/32	1/32	— 1/32
3 1/4	1 1/16	30	Trinidad Leasehold	2 1/32	2 1/32	1 1/16	1 1/16	— 1/16
5/8	1/32	....	Utd. Brit. of Trinidad (6s. 8d.)	1/32	1/32	1/32	1/4	— 1/32
3 1/16	1 1/16	20	Venezuelan Oil Concessions	1 1/8	1 1/8	1 1/16	1 1/8	— 1/4

Nominal value of shares £1 unless otherwise indicated by bracketed figures.
° Denotes tax-free dividend. c—Denotes cents per share.

The Foreign Oil Legion

C. C. McDERMOND, one of the best known Americans in Venezuela, together with Dr. J. M. Travieso Paul represented the government of Venezuela at the International Petroleum Exposition at Tulsa last month. Mr. McDermond flew all the way from Venezuela to Tulsa. The trip, which takes two weeks by boat plus U. S. railroad travel, was made in three and one-half days.

▼

CAPT. W. DURANT, chief of transportation for the Lago Petroleum Company at Maracaibo is at his home in Nova Scotia for his vacation.

▼

CAPT. W. C. CLARK, marine agent of the Venezuelan Gulf Oil Company at Maracaibo is on vacation at the Canal Zone.

▼

L. W. CHUTER, store superintendent of the Anglo Persian, Company, was recently in England on his vacation.

▼

W. SEMPLE, chief transportation superintendent of the Anglo Persian Company has been in England on leave.

▼

Left to right: W. L. Connelt, L. V. Stanford, Harry F. Sinclair, and Daniel T. Pierce of the Sinclair Consolidated Oil Corp. in Germany whence they have just returned.

© International News Photos

THOMAS R. BRENMER is supervising construction of the new power plant of the Venezuelan Gulf Oil Corporation at Las Morochas, on behalf of the Westinghouse Electric & Manufacturing Co.

▼

T. S. COOKE, vice-president of the Pan-American Petroleum Company is back in the U. S. after visiting the Lake Maracaibo and Aruba properties of his company.

▼

J. OGILVIE has taken up his new duties in Trinidad as superintendent of production for the United British Oil Fields, Ltd. Mr. Ogilvie, until recently, was divisional superintendent for the Venezuelan Oil Concession at Maracaibo.

▼

O. SCHWANITZ, superintendent of transportation for the Venezuelan Oil Companies at Lagunillas, is visiting his old home in Germany for the first time in twenty years.

▼

G. HIGGENS, field superintendent, at La Rosa, of the Venezuelan Oil Concessions, has been transferred to the Maracaibo headquarters of the Company.

▼

N. E. BAKER, assistant to the chief geologist of the Standard Oil of New Jersey, is back in New York following a visit to the Venezuelan Oil fields.

▼

A. VANDER HEIDEN, field superintendent of the Venezuelan Oil Corporation at Maracaibo, has taken up duties at the Mene Grande field of the Company.

▼

CLARK ELDER, chief engineer of the Venezuelan Gulf Oil Corp., is on vacation in Texas.

▼

W. C. MITCHELL, general manager of the Anglo Persian's Llandarcy refinery is visiting the United States.

R. W. DUCKER, engineer of the Creole Petroleum Corporation, is now located at Punta De Leiva, Eastern Venezuela. Mr. Ducker and C. H. Lieb, general manager for Creole, made the trip from the Maracaibo basin in the Company's big Sikorsky plane.

▼

DR. H. R. LANG has been awarded the prize of $1500 per annum by the fellowship of the institution of Petroleum Technologists, Great Britain, for a further period of one year to continue his researches on the determination of the variations of the specific heat of typical crude oils with temperature.

▼

WORLD PETROLEUM will be glad if its subscribers abroad will promptly notify its New York office, 153 Waverly Place, of any changes in their addresses.

▼

CORNELIUS ZULVER, marine superintendent of the Anglo Saxon Petroleum Company, London, has been honored by the Queen of Holland, who has bestowed upon him the honor of Officer of the Order of Oranje Nassau.

▼

B. KURPERSCHOEK, Director of the United States Oil Company of Rotterdam, Holland, recently visited London.

▼

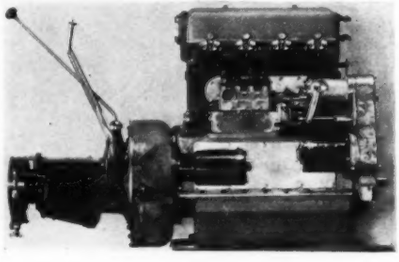
HARRY F. SINCLAIR, chairman of the Sinclair Consolidated Oil Corporation, and Daniel T. Pierce, assistant to the president, have returned to the United States following their recent visit to Europe.

▼

R. J. EICHE is touring the South American oil fields in the interest of the American Steel Export Company of New York. He will shortly proceed to Paris, France, and London, England.

▼

Diesel engine of truck referred to on page 498.



Latest Russian Petroleum Developments

Drilling Still 50 Per Cent Behind Schedule, With Production and Refining Ahead and Steadily Gaining. October Saw Tanker Shipment of Benzine to the United States. . . .

RUSSIA appears to be making steady progress with crude production and refining, although the drilling program averaged by all trusts is approximately 50 per cent behind its schedule, and which must have an important effect on future production. When making comparisons of July and August production and refining with the schedule for the year, it is to be considered that the program in relation to the five-year plan will be exceeded by about three per cent.

Considerable interest has been aroused by the cargo of 6000 tons of Grozni benzine delivered last month to the Island Export Company of Baltimore by the German tanker KARL LEONARD, which loaded at Touapse in the Black Sea. This shipment is reported to be of very good quality, and the Russians state that there is about 15 per cent more mileage to the gallon that can be obtained from American gasoline. Nothing or little is known about its anti-knock value.

Russian petroleum figures for July and August are as follows:

Production of crude oil in July amounted to 1,608,254 tons, and for August, 1,663,852 tons (11,257,778 and 11,646,964 bbl. respectively). The daily average is:

May	350,000	barrels	(50,000 tons)
June	347,900	"	(49,700 ")
July	365,900	"	(51,900 ")
August	377,300	"	(53,700 ")

Production in July was 7.4 per cent higher than in June, and 24.8 per cent higher than in July, 1929. Production in August was 2.8 per cent above the figure of July, and 29.7 per cent above the figure for August, 1929.

Following table shows production by the individual Oil trusts:

	July, 1930 (M. tons)	July, 1929 (M. tons)	August 1930 (M. tons)	August, 1929 (M. tons)
Azneft	901,115	827,598	921,285	835,208
Grozneft	661,913	430,983	694,455	414,998
Embaneft	31,684	26,943	31,316	27,583
Uralneft	249	.....	910	.....
Uzbekneft	4,293	1,829	4,052	2,189
Sakhalinneft	9 000	1,673	11,834	2,577
Turkmenneft	1,426	.....	.....	.....
	1,608,254	1,289,026	1,663,852	1,282,855

The current fiscal year will shortly be concluded, and a complete resumé of the results will be published.

Russia is now exporting petroleum products to the world's markets, and we give a table listing exports for the months of July and August.

Following are the drilling figures for August and July as accomplished by the individual Oil Trusts:

	July, 1930 (Meters)	July, 1929 (Meters)	August, 1930 (Meters)	August, 1929 (Meters)
Azneft	32,696	31,450	37,585	28,971
Grozneft	12,867	11,542	10,013	9,797
Embaneft	4,015	2,065	3,614	2,207
Uralneft	1,996	.....	1,851	.....
Sakhalinneft	960	292	747	362
Uzbekneft	.....	.....	808	245
	52,534	45,349	53,175	41,582

The above figures were:

	Meters	Meters	Meters	Meters
Production Drilling	35,327	29,968	37,507	29,454
Wildcatting in old fields	6,865	9,062	6,187	6,523
Wildcatting in new fields	10,342	6,319	10,923	5,605

Realization of Petroleum and Products in 1,000 metric tons:

	August, 1930			August, 1929		
	Int. Cons.	Export	Total	Int. Cons.	Export	Total
Gasoline and Ligroin	39.8	136.3	176.1	15.18	83.3	98.48
Kerosene	174.84	63.28	238.12	133.15	51.1	184.25
Diesel-fuel and Gas-oil	39.8	160.08	244.55	78.65	134.6	213.25
Heavy Lubricating	25.05	....	25.05	26.14	....	26.14
Other Lubricating	44.85	11.87	56.72	35.28	18.41	53.69
Fuel-oil (Mazut)	541.99	2.97	544.96	490.94	4.69	495.63
Solar-oil	....	7.00	7.00	....	8.50	8.50
Crude-oil	....	10.80	10.80	....	22.00	22.00
Other oil	....	....	....	....	....	....
	911.00	392.30	1303.3	779.34	322.6	1101.94
	July, 1930			July, 1929		
Gasoline and Ligroin	34.5	124.6	159.1	14.1	75.0	89.1
Kerosene	167.0	56.8	223.8	112.1	76.9	189.0
Diesel-fuel and Gas-oil	....	166.63	166.63	....	134.1	134.1
Heavy Lubricating	25.6	....	25.6	27.8	....	27.8
Other Lubricating	48.4	15.61	64.01	33.2	10.9	44.1
Fuel-oil (Mazut)	577.8	4.90	582.70	474.0	1.2	475.2
Solar-oil	....	9.1	9.1	....	8.1	8.1
Crude-oil	71.9	25.4	97.3	59.7	3.9	63.6
Other oil	....	0.1	0.1	....	....	....
	925.2	403.4	1328.6	720.9	310.1	1031.0

Export Figures by Countries of Destination

	August, 1930 M. tons	July, 1930 M. tons
England	52,309	94,730
Egypt	9,417	15,107
India	21,063	18,451
Germany	58,889	54,847
France	49,568	37,584

(Continued at end of next column)

	August, 1930 M. tons	July, 1930 M. tons
Italy	64,854	63,982
Belgium	....	15,285
Spain	44,556	27,844
Czecho Slovakia	6,300	7,652
Austria and Hungary	10,358	7,858
Turkey	17,761	2,665
Sweden	7,876	1,367
Bulgaria	....	....
Denmark	3,735	8,439
So. American Countries	8,484	....
Africa	10,608	12,390
Latvia and Lithuania	5,877	9,713
Central Europe	....	2,117
Greece	....	7,623
Esthonia	2,998	....
Finland	5,242	614
All others	12,251	14,801
	392,155	403,368
Persia	3,845	2,788
Manchuria	....	700
	396,000	406,856

TRIMO

GOING AHEAD *on Merit*

THROUGH good times and bad the TRIMO pipe wrench continues to move constantly forward in popularity in the oil fields.

Few tools can duplicate Trimo's history of steadily maintained leadership, that has been based on steadily maintained quality. Whenever strength, safety and service are considered TRIMO is the logical first choice.

ALL STEEL **TRIMO** PIPE WRENCH

Replaceable Insert Jaws
Handle drop forged--not cast

Made by Trimont Mfg. Co., Inc.
Roxbury (Boston), Mass., U. S. A.

Cable Address — Triwrench

DECEMBER FREE

WITH every subscription to WORLD PETROLEUM for the year 1931, mailed before the end of this year, a copy of the December, 1930, issue will be sent gratis.

WORLD PETROLEUM keeps all oil men fully informed on the major problems of the world's petroleum industry. Drilling, production, refining, transportation, marketing, distribution, finance, and personnel are covered in a thorough manner. Production figures from the principal oil fields of the world are given before obtainable elsewhere. Practically all editorial material published is exclusive to this journal, and is copyrighted.

Send your order now while the thought is in your mind.

Annual Subscription

$5.00

including world-wide postage.

WORLD PETROLEUM
153 Waverly Place
New York, N. Y., U. S. A.

I desire to subscribe for one year commencing January, 1931. Send your invoice for $5 and I will remit by check, draft, coinage of the country in which I reside, or by money order.

Yours truly,

Name .....
Position .....
Company .....
Address .....
Country .....